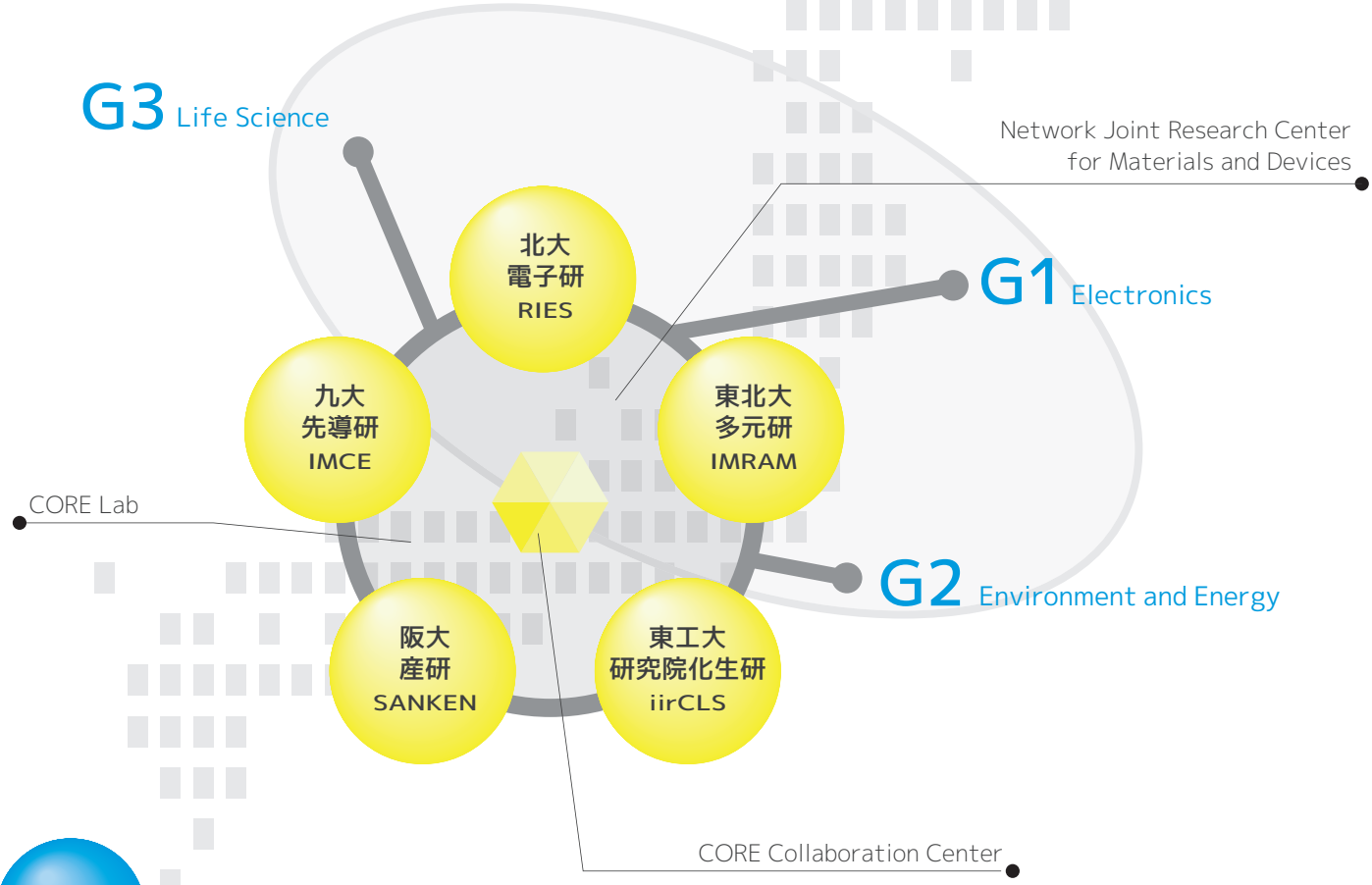


Five-Star

Dynamic Alliance for Open Innovation Bridging Human, Environment and Materials

人・環境と物質をつなぐイノベーション創出ダイナミック・アライアンス

Prospectus

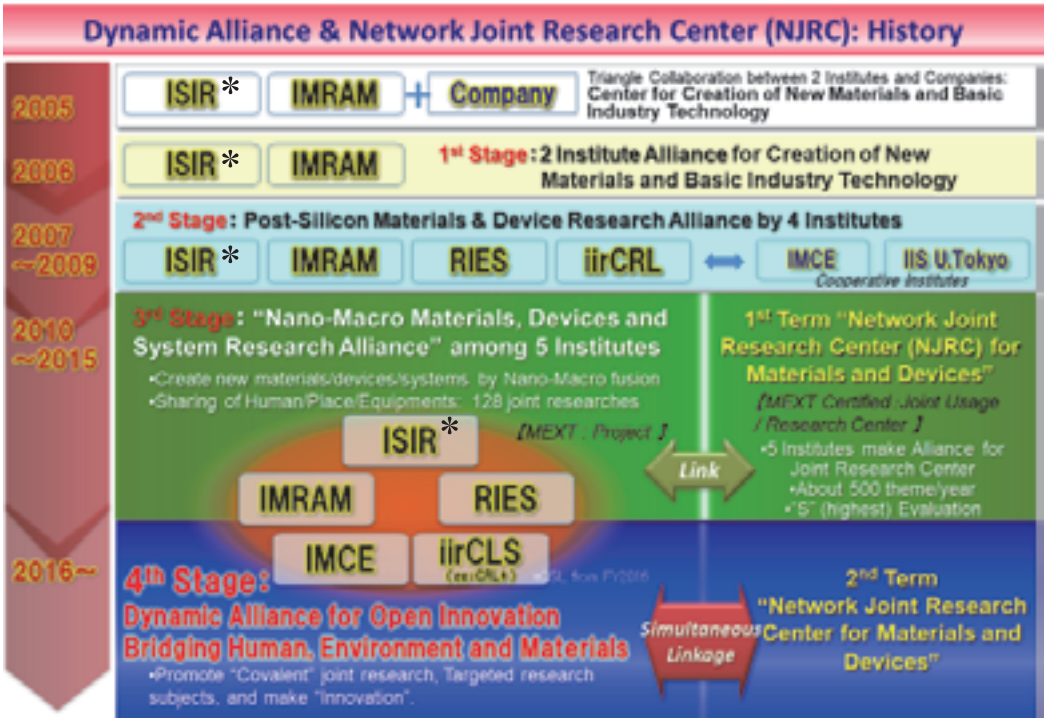
2021

Dynamic Alliance for Open Innovation Bridging Human, Environment and Materials

It started in 2005 with the triangular collaboration across the two research institutes The Institute of Scientific and Industrial Research (SANKEN*) Osaka University and Institute of Multidisciplinary Research for Advanced Materials (IMRAM), Tohoku University, and business companies in the field of materials and devices, followed by an unique “Alliance” project between SANKEN and IMRAM at the time in 2006, and from 2010 our “Alliance” project was extended to five research institutes, which include Research Institute for Electronic Science (RIES), Hokkaido University; IMRAM, Tohoku University; Laboratory for Chemistry and Life Science (iirCLS), Tokyo Institute of Technology; SANKEN, Osaka University; and Institute for Materials Chemistry and Engineering (IMCE), Kyushu University, and we have conducted robust joint ventures for the development of new materials and technologies. The unique “Cross-framed and Strategic Project for the Creation of Materials, Devices and Systems that Link the Nano and Macroscopic View through an Alliance of Research Institutes" has been launched, and has laid the foundation for this project.

The current “Five-star Alliance”, launched together with the 2nd Network Joint Research Center (NJRC) for Materials and Devices, is a six-year project starting in 2016, and aims to create innovations that will contribute to social issues related to humans and the environment, such as the creation of a safe, secure and healthy society, global environmental conservation and energy security. Under the theme of “Dynamic Alliance for Open Innovation Bridging Human, Environment and Materials(Five-star Alliance) ”, we have been carrying out distinctive “Alliance” and a wide range of collaboration in the field of materials and devices research.

In fiscal year 2021, which marks the final year of the project, we will continue to develop and grow as an organization that continues to evolve toward the culmination of the second phase of the project.



* The Institute of Scientific and Industrial Research (ISIR) has been renamed to “SANKEN” since June 2021.

Develop and deepen the scientific outcomes of collaboration among 5 Institutes of Alliance “Five-star Alliance”, Promote dense-covalent joint research Aiming to realize innovation with a clear target

“Five-star Alliance” has organized cross-institutional joint research groups in the three areas of “Electronics Materials and Devices (G1)”, “Environment and Energy Materials, Devices and Process (G2)”, and “Life Science Materials, Devices and Systems (G3)” for the purpose of promoting joint research among the five institutes.

To achieve excellence in interdisciplinary research, we have established “Cross-Ventilated (YOKOGUSHI) Subgroups" for dynamic and covalent strategic exchanges, and have been conducting cross-ventilated joint research across the above three groups. In fiscal year 2019, in addition to the two sub-groups, two new groups have been established in order to create a more transversal research environment. Moreover, we launched the "Alliance Technology Cross-Ventilated (YOKOGUSHI) Collaboration Program" with the aim of securing and developing the excellent engineers essential for generating excellent scientific outcomes. In addition to researchers, the program supports a wider range of collaborative activities by including engineers and other members of the research support team.

In addition, “Five-star Alliance” is complementary to the “Network Joint Research Center (NJRC) for Materials and Devices”, which is operated by the five research institutes, and this will contribute to the development of materials and device research in Japan by sharing human resources in a wide range of fields beyond the boundaries of research organizations.

From the perspective of fostering outstanding researchers of the next generation, we are promoting unique joint research programs, such as “Young Scientists Research Program” in which graduate students are appointed as Principal Investigators (PIs), and “CORE Lab Joint Research”, a mid- to long-term stay collaborative research project in which young researchers with excellent qualities and a promising future are appointed as PIs, taking into account the research environment and career paths of young researchers.

From fiscal year 2021, the eligibility for the " Young Scientists Research Program " was expanded to include undergraduate students, overseas research students, and students in College of National Institute of Technology, etc. As for the "CORE Lab", two labs were set up by overseas research institute PIs out of the 12 labs in 2021, and we are dynamically implementing the global exchange of people and research resources not only at domestic educational and research institutions, but also overseas.

Director of Operations
Tohru SEKINO
(SANKEN)

Chair
Hidekazu TANAKA
(SANKEN)

Vice-Chair
Tomoyuki AKUTAGAWA
(IMRAM)

G1 Leader
Shiyoshi YOKOYAMA
(IMCE)

G2 Leader
Masaaki FUJII
(iirCLS)

G3 Leader
Yoshinori NISHINO
(RIES)

Joint Research Programs in conjunction with NJRC (Network Joint Research Center for Materials and Devices)

■CORE Lab (Collaboration Research Lab)

The aim of CORE Lab is to have young researchers mid-to-long term stay in the alliance's member institutions (5 Core Institutes) as PIs for more intensive joint research.

■Expanded Collaborative Research Program A/B

The aim of this program is to develop the publicly-offered "Cooperative Research(※)" in the Joint Research Center (NJRC) for Materials and Devices, and aim to achieve excellence in interdisciplinary research.

※ Exploratory Basic Research Project by NJRC

■Young Scientists Research Program

Graduate students and other type of students from outside institutions are appointed as PIs, aiming to foster researchers and strengthen research capabilities for the next generation.

CORE Lab
Joint Research

The CORE Lab Program aims to achieve both mobility of human resources and research capabilities of PIs by sharing space, time, equipment, and personnel, and to produce outstanding scientific outcomes by selecting young talented researchers.

FY2021：
12 programs

Expanded Collaborative
Research Program B

In this program, the PI teams up with 5-alliance researchers from multiple institutions to deepen the outstanding interdisciplinary research and promote its development into a large-scale joint research project.

FY2021：
51 programs

Expanded Collaborative
Research Program A

This is a preliminary stage of the "Expended Collaborative Research Program B ", in which the PI teams up with multiple 5-alliance researchers to carry out interdisciplinary research.

FY2021：
Not implemented for the final year

Young Scientists
Research Program

This is a practical program in which graduate students and other type of students become PIs and conduct independent joint research, and PIs are certified as "NJRC Excellence Student Researchers" and supported in their career paths.

FY2021：
27 programs

Integrated academic research created by dynamic flow of people and research resources

Network Joint Research Center for Materials and Devices

A wide range of researchers in the field of materials and devices

Dynamic Alliance

RIES IMRAM iirCLS SANKEN IMCE

Network Joint Research Center Researcher Communities

Alliance Researcher

Joint Research Center Headquarters committee

■ **Masami TERAUCHI**
(IMRAM・Network Joint Research Center for Materials and Devices Director of Operations)

＊Joint Research Center Executive Committee

＊CORE Collaboration Center

- ＊**Masato KAKIHANA** (Chair of Joint Research Center Executive Committee)
- ＊**Yasutaka MATSUO** (RIES)
- ＊**Akihide HIBARA** (IMRAM)
- ＊**Shu YIN** (IMRAM)
- ＊**Nobuhiro NISHIYAMA** (iirCLS)
- ＊**Kunihiko NISHINO** (SANKEN)
- ＊**Satoru KIDOAKI** (IMCE)

Alliance Steering Committee

- ＊**Hidekazu TANAKA** (SANKEN・Chair) (Chair of CORE Collaboration Center)
- ＊**Tomoyuki AKUTAGAWA** (IMRAM・Vice-Chair) (Vice-Chair of CORE Collaboration Center)
- **Kuniharu IJIRO** (RIES)
- **Kimihisa YAMAMOTO** (iirCLS)
- **Tohru SEKINO** (SANKEN・Director of Operations)
- **Kazunari YOSHIZAWA** (IMCE)
- ＊**Hiromichi OHTA** (RIES)
- ＊**Masaaki FUJII** (iirCLS)
- ＊**Shiyoshi YOKOYAMA** (IMCE)

G3 Life Science
Materials, Devices and System

【G3 Leader】
Yoshinori NISHINO (RIES)
【Planning and Promotion Leader】
Tamiki KOMATSUZAKI (RIES)
【Vice-Leader】
Masaharu NAGAYAMA(RIES)
Takehiko WADA (IMRAM)
Shin MIZUKAMI (IMRAM)
Hiroshi UEDA (iirCLS)
Kunihiko NISHINO (SANKEN)
Masaru TANAKA (IMCE)

Cross-Ventilated (YOKOGUSHI) -Subgroups※

※Cross over the three groups of G1-G3

G1 Electronics
Materials and Devices

【G1 Leader】
Shiyoshi YOKOYAMA (IMCE)
【Planning and Promotion Leader】
Takeshi YANAGIDA (IMCE)
【Vice-Leader】
Hiromichi OHTA (RIES)
Taku J SATO (IMRAM)
Hitoshi KASAI (IMRAM)
Atsushi SHISHIDO (iirCLS)
Daichi CHIBA (SANKEN)
Hirotsugu KIKUCHI (IMCE)

G2 Environment and Energy
Materials, Devices, and Process

【G2 Leader】
Masaaki FUJII (iirCLS)
【Planning and Promotion Leader 】
Takeo YAMAGUCHI (iirCLS)
【Vice-Leader】
Akira ISHIBASHI (RIES)
Shu YIN (IMRAM)
Takahisa OMATA (IMRAM)
Takeo YAMAGUCHI (iirCLS)
Shin-ichiro TANAKA (SANKEN)
Shigeto OKADA (IMCE)

Alliance Research Promotion Group

Dynamic Alliance to foster the power to open up a new era
Places to discuss and friends

■Alliance Joint Web Session of The Research Project Groups, November 27, 2020.

—Dynamic Alliance Support Program FY2020—

- Alliance web session of The Research Project Groups, November 27,2020. (above picture)
- The 9th Alliance Technical support symposium by online, December 2, 2020.
- Lectures NCTU-5 Star Alliance 2020 online.
- Alliance Young Researchers Support Program：6programs
- Dynamic Alliance International Joint Research Project：72programs
- Cross-Ventilated (YOKOGUSHI) subgroup activities by 4 groups, and support for each research group activity, etc.

Dynamic Alliance (Five-star Alliance) Organization Chart

Director of Operations
Tohru SEKINO (SANKEN)

Steering Committee

Chair Hidekazu TANAKA (SANKEN)

Vice-Chair Tomoyuki AKUTAGAWA (IMRAM)

RIES Kunihiro IJIRO、Hiromichi OHTA

IMRAM Masami TERAUCHI、Akihide HIBARA

iirCLS Kimihisa YAMAMOTO、Masaaki FUJII

SANKEN Tohru SEKINO、Kunihiko NISHINO
Masato KAKIHANA

IMCE Kazunari YOSHIZAWA、Shiyoshi YOKOYAMA

CORE Collaboration Center

Director Hidekazu TANAKA

Vice-Director Tomoyuki AKUTAGAWA

RIES Kuniharu IJIRO、Hiromichi OHTA

IMRAM Akihide HIBARA、Shu YIN

iirCLS Masaaki FUJII、Nobuhiro NISHIYAMA

SANKEN Kunihiko NISHINO、Masato KAKIHANA

IMCE Shiyoshi YOKOYAMA、Satoru KIDOAKI

G1 Electronics Materials and Devices

Leader Shiyoshi YOKOYAMA (IMCE)

Planning and Promotion Leader Takeshi YANAGIDA (IMCE)

RIES

Prof. H. OHTA ※V
Prof. K. SASAKI
Prof. T. NAKAMURA
Assoc.Prof. T.KATAYAMA
Assoc. Prof. K. KOKADO
Assoc. Prof. K. KONDO
Assoc. Prof. A. TAGUCHI

IMRAM

Prof. T. J SATO ※V
Prof. H. KASAI※V(sub)
Prof. T. AKUTAGAWA
Prof. T. ABUKAWA
Prof. S. OKAMOTO
Prof. H. KIMURA
Prof. H. KUMIGASHIRA
Prof. T. KOMEDA
Prof. H. JINNAI
Prof. M. TAKATA
Prof. S. CHICHIBU
Prof. M. NAKAGAWA

iirCLS

Prof. A. SHISHIDO ※V
Prof. T. FUKUSHIMA
Assoc. Prof. T. IMAOKA
Assoc. Prof. S. KUBO
Assoc. Prof. Y. SHOJI

SANKEN

Prof. D.CHIBA ※V
Prof. Y. IE
Prof. A. OIWA
Prof. T.KOZAWA
Prof. Y.SAKURAI
Prof. K.SUENAGA
Prof. T.SEKITANI
Prof. H.TANAKA
Prof. M. NOGI
Prof. Y. YOSHIDA
Prof. T. WASHIO
Assoc. Prof. K.SHIRAI

IMCE

Prof. H. KIKUCHI ※V
Prof. K. TAMADA
Assoc. Prof. Y. OKUMURA
Assoc. Prof. H.SAITO
Assoc. Prof. F.TANI
Assoc. Prof. K. FUJITA

※V・Vice-Leader

G2 Environment and Energy
Materials, Devices and Process

Leader Masaaki FUJII (iirCLS)

Planning and Promotion Leader Takeo YAMAGUCHI (iirCLS)

RIES

Prof. A. ISHIBASHI ※V
Prof. J.NISHII
Prof. Y.MATSUO
Specially-Appointed Prof. H. MISAWA
Assoc.Prof. M.ONO

IMRAM

Prof. S. YIN ※V
Prof. T. OMATA ※V(sub)
Prof. T. ADSCHIRI
Prof. K. AMEZAWA
Prof. S. UEDA
Prof. H. KATO
Prof. K. KANIE
Prof. J. KANO
Prof. S.KAMEOKA
Prof. A. KIRISHIMA
Prof. E. SHIBATA
Prof. H. SHIBATA
Prof. Y. TAKAHASHI
Prof. M. TERAUCHI
Prof. H. NISHIHARA
Prof. H. NOGAMI
Prof. H. FUKUYAMA
Prof. I. HONMA
Prof. A. MURAMATSU
Prof. T.YAMADA
Prof. H. YAMANE

iirCLS

Prof. T. YAMAGUCHI ※V
Prof. M. AKITA
Specially-Appointed Prof. K. OSAKADA
Prof. K. YAMAMOTO
Assoc. Prof. T. TAMAKI
Specially Appointed Assoc. Prof. K.NAGAI
Assoc. Prof. J. NOMURA KONDO

SANKEN

Assoc. Prof. S. TANAKA※V
Specially-Appointed Prof. M. KAKIHANA
Prof. T. SEKINO
Prof. M. FUJITSUKA
Prof. T. HOSOKAI
Prof. Y.YAMADA
Assoc. Prof. A. N. HATTORI
Assoc. Prof. Y. HONDA
Assoc. Prof. T. MATSUMOTO

IMCE

Prof. S. OKADA ※V
Prof. J. HAYASHI
Prof. M. MURAYAMA
Prof. S. YOON
Prof. K. YOSHIZAWA
Assoc. Prof. K. ALBRECHT
Assoc. Prof. M. ITO
Assoc. Prof. S. KUDO
Assoc. Prof. K. KOJIO
Assoc. Prof. Y. TAKAHASHI
Assoc. Prof. J. MIYAWAKI

G3 Life Science
Materials, Devices and System

Leader Yoshinori NISHINO (RIES)

Planning and Promotion Leader Tamiki KOMATSUZAKI (RIES)

RIES

Prof. M. NAGAYAMA ※V
Prof. K.IJIRO
Prof. H. UJII
Prof. N. TAMAOKI
Prof. T. NAKAGAKI
Prof. V. P. BIJU
Prof. H.MIKAMI
Assoc. Prof. H. AONUMA
Assoc. Prof. Y. KIM
Assoc. Prof. Y. KOBAYASHI
Assoc. Prof. K. SATO
Assoc. Prof. Y. SATO
Assoc.Prof. A.SHIBUKAWA
Assoc. Prof. Y. TAKANO
Assoc. Prof. K. HIRAI
Assoc. Prof. H. MITOMO

IMRAM

Prof. T. WADA ※V
Prof. S. MIZUKAMI※V(sub)
Prof. K. INABA
Prof. S. SATO
Prof. S. TAKAHASHI
Prof. M. TAKAHASHI
Prof. F. NAGATSUGI
Prof. E. NANGO
Prof. A. HIBARA
Prof. A. MOMOSE
Prof. W.YASHIRO

iirCLS

Prof. H. UEDA ※V
Prof. S. ISHIUCHI
Prof. T.SUZUKI
Prof. K. TANAKA
Prof. H. NAKAMURA
Prof. N. NISHIYAMA
Prof. T. HISABORI
Prof. M. YOSHIZAWA
Assoc. Prof. S. OKADA
Assoc. Prof. T. KITAGUCHI
Assoc. Prof. Y. MIURA
Assoc. Prof. K. WAKABAYASHI

SANKEN

Prof. K. NISHINO ※V
Prof. S. KURODA
Prof. K. KOMATANI
Prof. H. SASAI
Prof. T. SUZUKI
Prof. M. TANIGUCHI
Prof. T. NAGAI
Prof. M. NUMAO
Prof. Y. MAKIHARA
Prof. Y. YAGI
Assoc. Prof. T. SUZUKI
Assoc. Prof. C. DOHNO

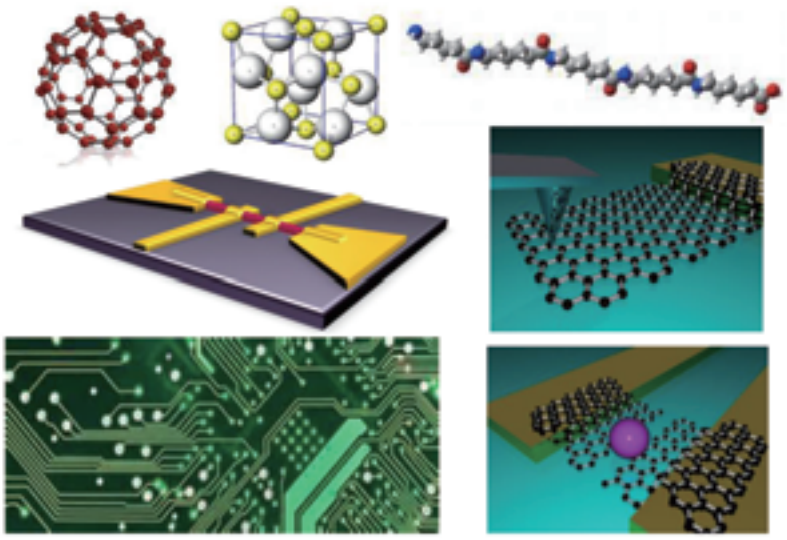
IMCE

Prof. M. TANAKA ※V
Prof. S. KIDOAKI
Prof. M. SHINDO
Assoc. Prof. T. ANADA
Assoc. Prof. Y. ARIMA
Assoc. Prof. H. ISE
Assoc. Prof. A. KANO

G1 Electronics Materials and Devices Research Project Group

Outline of G1 Research

The object of the "Electronics Materials and Devices" group (G1) is to create and control organic, inorganic, and hybrid materials for the applications of electronics, photonics, and spintronics devices. External control of materials properties and integration technique of the novel devices will be investigated to realize the new functional devices. We aim science and technological contribution to human /environmental harmony.



Main members and their research subjects

<Group Leader>
Prof.
Shiyoshi YOKOYAMA (IMCE)

■Polymer photonics for high performance optical device application

Keywords: Nonlinear optical polymer
Nano photonics
Electro optic

<Planning and Promotion Leader>
Prof.
Takeshi YANAGIDA (IMCE)

■Creation of functional nanowire materials/properties/devices towards next generation electronics

Keywords: Functional Nanodevices
Nanowires
Electronics

<Vice-Leader>
Prof.
Hiromichi OHTA (RIES)

■Photo-electronic-thermal transport properties of conducting oxide films

Keywords: Thermoelectric,
Superstructure, oxide electronics

Prof.
Keiji SASAKI (RIES)

■Optical manipulation of nanomaterials and their structures

Keywords: Optical force, Plasmonics,
Nano-shaping, Optical vortex

Prof.
Takayoshi NAKAMURA (RIES)

■Development of novel electronic materials based on molecular rotators

Keywords: Molecular rotator, Supramolecules, Ferroelectrics, Multiferroics

Assoc. Prof.
Tsukasa KATAYAMA (RIES)

■Development of magnetic and dielectric oxide thin films

Keywords: Oxide films, Magnetism, Ferroelectricity, Mixed anion

Assoc. Prof.
Kenta KOKADO (RIES)

■Precise polymer synthesis based on structural order of porous crystals

Keywords: Porous crystals, Polymer synthesis, Supramolecular chemistry, Network polymer

Assoc. Prof.
Kenji KONDO (RIES)

■Theoretical study of spin transport and the calculation of electronic structure of low-dimensional electron gas systems

Keywords: Condensed matter theory, Spintronics, Semiconductor device engineering, First principle electronic structure calculation

Assoc. Prof.
Atsushi TAGUCHI (RIES)

■DUV plasmonics and nano-imaging

Keywords: Plasmonics in UV, Nano-imaging, Resonant Raman scattering, nano-fabrications

<Vice-Leader>
Prof.
Taku J SATO (IMRAM)

■Spin dynamics in condensed matter by neutron inelastic scattering

Keywords: Neutron inelastic scattering, Unconventional superconductor, Quantum spin systems

<Vice-Leader(sub)>
Prof.
Hitoshi KASAI (IMRAM)

■Fabrication of The Novel Nanodrugs Composed of Poorly Water-Soluble Compounds

Keywords: Nano Drugs/Organic Nanoparticles/Anti-cancer Drugs

Prof.
Tomoyuki AKUTAGAWA (IMRAM)

■Fabrication of new molecular devices with charge-transfer interactions

Keywords: Molecular crystal, Charge transfer, Ferroelectricity

Prof.
Tadashi ABUKAWA (IMRAM)

■Atomic-level characterization of solid surfaces and interfaces for new surface functions

Keywords: Surface structure,Surface dynamics,Electron diffraction,Nano surface analysis

Prof.
Satoshi OKAMOTO (IMRAM)

■Magnetic devices based on spin dynamics of magnetic materials

Keywords: Spin dynamics, Ferromagnetic material, Magnetization reversal

Prof.
Hiroyuki KIMURA (IMRAM)

■Structural physics on novel condensed matter by complimentary use of SORX-ray- Neutron structure analysis

Keywords: SOR- X-ray- Neutron diffraction, Accurate magnetic and crystal structure analysis, Magnetoelectric oxides, Organic ferroelectric and magnetic materials

Prof.
Hiroshi KUMIGASHIRA (IMRAM)

■Design of novel functionalities in oxide nanostructures using advanced spectroscopy

Keywords: Synchrotron-radiation spectroscopy, Functional nanomaterials, Oxide electronics

Prof.
Tadahiro KOMEDA (IMRAM)

■Development of single molecule devices with spin degree of freedom

Keywords: Molecule electronic, Molecular spintronics, Scanning tunneling probes

Prof.
Hiroshi JINNAI (IMRAM)

■"In-situ" 3D observations of selfassembling processes soft materials
with advanced electron tomography

Keywords: Electron tomography, In-situ visualization, Self-assembling processes, Soft materials

Prof.
Masaki TAKATA (IMRAM)

■Development of materials visualization photon science

Keywords: Synchrotron radiation, X-ray diffraction, Maximum entropy method, Charge density study

Prof.
Shigefusa CHICHIBU (IMRAM)

■Light-matter coupling and ultrafast spectroscopy in semiconductor nanostructures

Keywords: Femtosecond electron beam, Nitide semiconductors, Oxide semiconductors

Prof.
Masaru NAKAGAWA (IMRAM)

■Process/Material Science and Device Innovation in Nanoimprint Technology

Keywords: Print & imprint method, Lithography, Laser processing

<Vice-Leader>
Prof.
Atsushi SHISHIDO (iirCLS)

■Development of functional soft materials and its application to optoelectronics

Keywords: Soft material, Liquid crystal, Photonics, Polymer

Prof.
Takanori FUKUSHIMA (iirCLS)

■Development of new soft materials using strategically designed π-electronic systems

Keywords: π-Electronic Materials, Self-assembly, Soft materials, Organic electronics

Assoc. Prof.
Takane IMAOKA (iirCLS)

■Functionality programming of metal clusters based on an exact atomicity control

Keywords: nanoparticles, clusters, catalysis, photoluminescence

Assoc. Prof.
Shoichi KUBO (iirCLS)

■Development of anisotropic functional nanomaterials based on oriented soft materials

Keywords: Soft materials, Nanomaterials, Anisotropy

Assoc. Prof.
Yoshiaki SHOJI (iirCLS)

■Devepment of π-conjugated molecules and polymers for electronics and optoelectronics

Keywords: π-Electronic Materials, Main Group Element, Organic Devices

<Vice-Leader>
Prof.
Daichi CHIBA (SANKEN)

■Development of flexible spintronics sensors

Keywords: Spintronics, Flexible sensors, Magnetoelectronics

Prof.
Yutaka IE (SANKEN)

■Development of functional organic materials for electronics

Keywords: Conjugated compounds, Molecular wires, Organic and molecular devices

Prof.
Akira OIWA (SANKEN)

■Research on novel quantum hybrid devices based on spins and photons

Keywords: Low-dimensional semiconductor physics, Quantum information processing, Quantum hybrid system, Spintronics

Prof.
Takahiro KOZAWA (SANKEN)

■Development of lithography process and materials for semiconductor devices

Keywords: Quantum beam Lithography Biomaterials Pulse radiolysis

Prof.
Yasushi SAKURAI (SANKEN)

■AI Information Extraction for Nano-electronics Devices

Keywords: Big Data Mining, Time-Series Analysis, Nano-electronics Devices

Prof.
Kazu SUENAGA (SANKEN)

■Atomic structures and local properties of low-dimensional materials

Keywords: TEM, STEM, EELS, Nano-structured materials

Prof.
Tsuyoshi SEKITANI (SANKEN)

■Flexible integrated circuits for large-area sensor applications

Keywords: Social devices Flexible transistors Integrated circuits Large-area sensors

Prof.
Hidekazu TANAKA (SANKEN)

■Development of 3 dimensional oxide nano-structured electronics

Keywords: Nanostructures, Functional Oxide, Nano/Spin-electronics

Prof.
Masaya NOGI (SANKEN)

■Nanocellulose materials for flexible electronics

Keywords: Nanocellulose, Transparent nanopaper, Flexible substrate

Prof.
Yoichi YOSHIDA (SANKEN)

■Research of the radiation induced chemical reactions by using the atto-second electron beam

Keywords: Atto-second electron beam, Atto-second pulse radiolysis, radiation chemistry

Prof.
Takashi WASHIO (SANKEN)

■Measurement and Control Oriented Machine Learning for Advanced Applications

Keywords: Machine Learning, Statistical Estimation, Optimization, Advanced Sensing, Advanced Control

Assoc. Prof.
Koun SHIRAI (SANKEN)

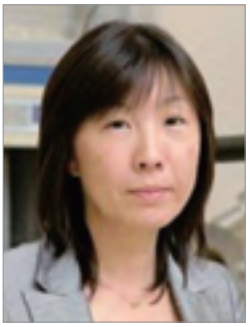
■Theoretical study on materials and materials design by first-principles calculations

Keywords: Material design, Electronic structure, First-principles calculations

<Vice-Leader>
Prof.
Hirotsugu KIKUCHI (IMCE)

■Three dimensional lattice structure and Kerr effect of liquid crystal blue phases

Keywords: Liquid crystal blue phase
Electro-optic Kerr effect
Soft matter



Prof.
Kaoru TAMADA (IMCE)

■Innovative nanobio detection with plasmon nanoantenna

Keywords: Plasmonics
Nanomaterials
Bioimaging

Assoc. Prof.
Yasushi OKUMURA (IMCE)

■Development of functional soft matter based on microscopic observation

Keywords: Soft matter
Liquid crystal
Confocal microscope

Assoc. Prof.
Hikaru SAITO (IMCE)

■Development of rapid transmission electron microscopy and spectroscopy and applications for in-situ nanoscopic analysis

Keywords: STEM
cathodoluminescence
EELS
machine learning

Assoc. Prof.
Fumito TANI (IMCE)

■Development of functional organic compounds based on unique pi-electron structures

Keywords: Organic pi-compounds
NIR-dye
Redox
Semiconductivity

Assoc. Prof.
Katsuhiko FUJITA (IMCE)

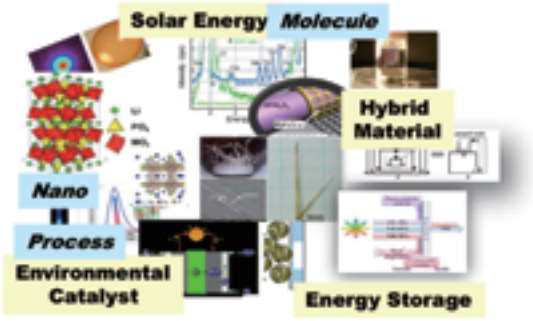
■Development of fabrication process and materials for organic electronic devices

Keywords: Organic electronics
Organic photovoltaic cells
OLED

G2 Environment and Energy Materials, Devices and Process Research Project Group

Outline of G2 Research

The activity of the "Environment and Energy Materials, Devices and Process" group (G2) covers promotion of the studies to design environmental catalysts for industry, to realize ecological processing for a low carbon society, and to create new hybrid substances for environmental and energy issues. The studies will contribute to make new environmentally benign materials and devices as well as ubiquitous system integration.



Main members and their research subjects

<Group Leader>
Prof.
Masaaki FUJII (iirCLS)

■Functional Analysis of Molecular Building Blocks by Advanced Laser Spectroscopy

Keywords : Molecular Recognition, Laser Spectroscopy, Intermolecular Interaction

<Planning and Promotion Leader>
Prof.
Takeo YAMAGUCHI (iirCLS)

■Design and development for fuel cell materials and devices

Keywords : electrolyte membrane, catalysts, polymer electrolyte fuel cell, solid alkaline fuel cell

<Vice-Leader>
Prof.
Akira ISHIBASHI (RIES)

■High efficiency solar cells and clean systems

Keywords : Solar cell, high efficiency, clean system

Prof.
Junji NISHII (RIES)

■New functions using subwavelengh structure

Keywords : Subwavelength Optics
Inorganic Materials
Nanoimprint

Prof.
Yasutaka MATSUO (RIES)

■Development of specific surface induced specific physical/chemical phenomena by using nano, micro fabrication

Keywords : Nano,Micro-fabrication,

Specially-appointed Prof.
Hiroaki MISAWA (RIES)

■Development of artificial photosynthesis systems using plasmonic antennae

Keywords : Localized plasmon, Nanomaterials, Plasmonic chemistry

Assoc. Prof.
Madoka ONO (RIES)

■Development of non-organic amorphous material by controlling its structure

Keywords : Oxide glass, Structural fluctuation, Optical properties, Mechanical properties

<Vice-Leader(sub)>
Prof.
Takahisa OMATA (IMRAM)

■Development of inorganic energy conversion materials using ion-exchange

Keywords : Material Design, Topotactic Ion-Exchange, Proton Conductor, Solar Cell Absorber

Prof.
Koji AMEZAWA (IMRAM)

■Development of environmentally-friendly energy conversion devices based on solid state ionics

Keywords : Solid state ionics, Energy conversion, Fuel cells Batteries

Prof.
Hideki KATO (IMRAM)

■Development of inorganic materials for chemical reactions in sustainable society

Keywords : Artificial photosynthesis, Photocatalysts, Solid acid-base catalysts

Prof.
Junya KANO (IMRAM)

■Novel powder processing for renewable energy and its efficiency improvement

Keywords : Biomass, Mechanochemical processing, DEM simulation

Prof.
Arira KIRISHIMA (IMRAM)

■Radiochemistry in Nuclear Waste Management and Nuclear Facility Decommissioning

Keywords : Radioactive waste management, Naturally Occurring Radioactive Materials

<Vice-Leader>
Prof.
Shu YIN (IMRAM)

■Creation of multi-functional environmental responsive nanomaterials

Keywords : Multi-functional; Environmental response; Eco-materials

Prof.
Tadafumi ADSCHIRI (IMRAM)

■Supercritical hydrothermal synthesis of organic-inorganic hybrid nanoparticles

Keywords : Supercritical fluid, Organic inorganic hybrid materials, Nanoparticles

Prof.
Shigeru UEDA (IMRAM)

■Optimization of high temperature processing for base metal

Keywords : Material processing, Iron and steelmaking, High temperature physical chemistry, Material recycling

Prof.
Kiyoshi KANIE (IMRAM)

■Development of Hybrid Materials based on Precise Liquid Phase Synthesis of Nanoparticles

Keywords : Nanoparticle, Organic-Inorganic Hybrid, Self-Organization

Prof.
Satoshi KAMEOKA (IMRAM)

■Metallurgy for advanced metallic catalysis materials

Keywords : Metallic catalyst, Porous metal, Metal-oxide composite, Nano-bulk hybrid materials

Prof.
Etsuro SHIBATA (IMRAM)

■Establishment of metal resource circulation engineering

Keywords : Non-ferrous metallurgy, Recycling, Waste treatment

Prof.
Hiroyuki SHIBATA (IMRAM)

■Thermal properties of molten silicates and solution growth of SiC

Keywords : Thermal property,Molten silicates,Silicon carbide, Solution growth

Prof.
Masami TERAUCHI (IMRAM)

■Electron crystallography & spectroscopy based on electron microscopy

Keywords : Convergent-beam electron diffraction, Electron energy-loss spectroscopy, Soft-X-ray emission spectroscopy

Prof.
Hiroshi NOGAMI (IMRAM)

■Development of novel material processing through kinetic based reaction analysis

Keywords : Process analysis, Thermal fluid analysis, Reaction kinetics

Prof.
Itaru HONMA (IMRAM)

■Advanced nanotechnologies for energy conversion devices

Keywords : Lithium ion batteries, Supercapacitor, Solar cells/Fuel cells, Nanomaterials/Nanoprocessing

Prof.
Takahiro YAMADA (IMRAM)

■Exploration of novel inorganic functional materials and development of new synthetic processes

Keywords : Intermetallic compounds, Thermoelectric materials, Crystal structure analysis, Flux method

Prof.
Munetaka AKITA (iirCLS)

■Visible light-driven organic synthesis by photoredox catalysis

Keywords : Visible light, Photoredox catalysis, Organic synthesis

Prof.
Yukio TAKAHASHI (IMRAM)

■Multi-scale structure analysis of functional materials by X-ray ptychography

Keywords : X-ray ptychography, synchrotron radiation, functional materials, structure analysis

Prof.
Hirotomo NISHIHARA (IMRAM)

■Development of carbon-based functional materials

Keywords : Nanoporous materials, Graphene, Energy conversion/storage

Prof.
Hiroyuki FUKUYAMA (IMRAM)

■High-temperature physical chemistry of materials

Keywords : Chemical thermodynamics, Thermophysical properties of high-temperature melts, Crystal growth

Prof.
Atsushi MURAMATSU (IMRAM)

■Synthesis processing of nanoparticulate functional materials in liquid-phase

Keywords : Nanoparticles, Synthesis process, Hybrid materials

Prof.
Hisanori YAMANE (IMRAM)

■Synthesis and crystal structure analysis of new multinary inorganic compounds

Keywords : Multinary metal oxide, suboxide, and nitrides, X-ray diffraction, Flux growth

Specially Appointed Prof.
Kohtaro OSAKADA (iirCLS)

■Structure and Properties of Organometallic Middle-Molecule Compounds

Keywords : silane, organometallics, oligomer, optical properties

Prof.
Kimihisa YAMAMOTO (iirCLS)

■Development of Subnano Hybrid Materials

Keywords : Subnano Particles, Dendrimer, Hybrid Materials

Assoc. Prof.
Takanori TAMAKI (iirCLS)

■Development of High-Performance Enzymatic Biofuel Cells

Keywords : Bioelectrochemistry, Enzyme, Systematic material design

Specially Appointed Assoc. Prof.
Keiji NAGAI (iirCLS)

■Photoenergy conversion materials -Organophotocatalyst & Quantum beam source-

Keywords : Photocatalyst, photo-energy conversion, water purification

Assoc. Prof.
Junko NOMURA KONDO (iirCLS)

■Preparation of mesoporous metal oxides and IR characterization of solid calayst surfaces

Keywords : Porous material, Metal oxide, IR, Catalyst

<Vice-Leader>
Assoc. Prof.
Shin-ichiro TANAKA (SANKEN)

■Electron dynamics in the solid and on the solid surface by means of the electon spectscopies

Keywords : Time-resolved two-photon photoelectron spectroscopy. High-resolution angle-resolved photoelectron spectroscopy. High-resolution electron-energy loss spectroscopy.

Specially-appointed Prof.
Masato KAKIHANA (SANKEN)

■Construction of high-performance photoceramics

Keywords : Photocatalyst, Phosphor, Exploration of new materials

Prof.
Tohru SEKINO (SANKEN)

■Creation of multi-task material through multi-dimensional structure and function tuning

Keywords : Nanocomposite, Low-dimentional nanomaterials, Functional Structure Ceramics

Prof.
Mamoru FUJITSUKA (SANKEN)

■Chemistry of highly activated species generated by photo- and electron beam irradiation

Keywords : Excited intermediate, super oxidant, super reductant, photocatalyst

Prof.
Tomonao HOSOKAI (SANKEN)

■Study on laser-driven quantum beams and its application.

Keywords : Laser-driven quantum beams, Laser plasma interaction, Relativistic plasma

Prof.
Yuki YAMADA (SANKEN)

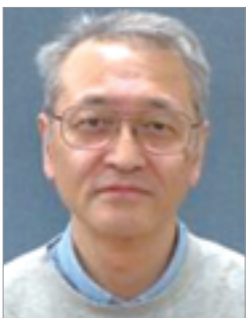
■Development of next-generation energy-storage devices

Keywords : Batteries, electrolytes, electrochemistry

Assoc. Prof.
Azusa N. HATTORI (SANKEN)

■Nanoscale physical properties on the three-dimesionally-architected structures

Keywords : three-dimensional nanostructure, nanoscale physical property,



Assoc. Prof.
Yoshihide HONDA (SANKEN)

■Development of diagnostic methods for materials based on radiation-related technology

Keywords : Polymer, Clay, Positron, Electron beam

Assoc. Prof.
Taketoshi MATSUMOTO (SANKEN)

■Fundamental studies and new applications of functional silicon materials.

Keywords : Silicon materials, Photovoltaics, Silicon anode

Prof.
Jun-ichiro HAYASHI (IMCE)

■Carbon resources conversion for carbon-recycling industries

Keywords : carbon-neutral/negative conversion, fossil fuel, biomass

Prof.
Seong-Ho YOON (IMCE)

■Development of high anti-oxidative carbon supporting material and its application to PEMFC catalyst

Keywords : Fuel Cell
Carbon black
Anti-oxidative

Assoc. Prof.
Ken ALBRECHT (IMCE)

■Development of new electrostatic catalysis reaction

Keywords : Electrostatic catalysis

Assoc. Prof.
Shinji KUDO (IMCE)

■Eco-friendly conversion of organic and inorganic natural resources

Keywords : Biomass
Carbon resources
Reaction engineering

Assoc. Prof.
Yoshiaki TAKAHASHI (IMCE)

■Hierarchical structure and physical properties of polymers

Keywords : Natural polymers, Ionic liquids, Rheology

<Vice-Leader>
Prof.
Shigeto OKADA (IMCE)

■Development of post lithium-ion batteries

Keywords : Sodium-ion battery
Cathode active material
Intercalation
Conversion reaction

Prof.
Mitsuhiro MURAYAMA (IMCE)

■Explore the internal behavior of structural and Earth materials in real-time and sub-microscopic levels by 3D and in-situ electron microscopy

Keywords : transmission electron microscopy
nano-geochemistry/geophysics structural materials

Prof.
Kazunari YOSHIZAWA (IMCE)

■Theoretical study of catalytic reactions and collaborations with experiment

Keywords : Theoretical chemistry, Catalytic reactions, Activation of small molecules

Assoc. Prof.
Masato ITO (IMCE)

■Molecular design for energy saving

Keywords : Electrode active material, Gas barrier material, Molecular catalyst

Assoc. Prof.
Ken KOJIO (IMCE)

■Development of recyclable tough elastomers

Keywords : Thermoplastic elastomers
Recycle
Tough

Assoc. Prof.
Jin MIYAWAKI (IMCE)

■Design and development of high-performance porous adsorbent materials

Keywords : Porous materials, Adsorption, Heat pump

G3 Life Science Materials, Devices and System Research Project Group

Outline of G3 Research

The objective of the "Life Science Materials, Devices and System" group(G3) is to create cutting-edge technologies for the elucidation of biological functions by advanced optical imaging, molecular structural analyses, and utilizing mathematical and information sciences. By the harmonized developments in information of both biomolecules and biological functions and the synthesis of molecules, we provide novel functional materials and devices that contribute to life-innovation in the 21st century.

Main members and their research subjects

<Group Leader>
Prof.
Yoshinori NISHINO (RIES)

■Deep Nano-Imaging Using Synchrotron Radiation and X-ray Free-Electron Lasers

Keywords: Phase Imaging, Controlled Environment Imaging, Coherent X-rays

<Planning and Promotion Leader>
Prof.
Tamiki KOMATSUZAKI (RIES)

■Developments of data-driven mathematics and concepts insingle molecule biology

Keywords: Single Molecule Biology, Multiscale Dynamics in Complex Systems, Molecular Data Science

<Vice-Leader>
Prof.
Masaharu NAGAYAMA (RIES)

■Understanding of nonlinear phenomena using mathematical modeling

Keywords: Mathematical modeling, Reaction-diffusion system, Numerical simulation

Prof.
Kuniharu IJIRO (RIES)

■Development of biomimetic nanofabrication method using molecular self-assembly

Keywords: Biomimetics, Nanomaterial, Self-assembly

Prof.
Hiroshi UJI-I (RIES)

■Heterogeneous dynamics at mesoscopic scale will be in vestigated using super resolution (sing lemolecule) fluorescence (Raman) microscopy. Particularly, biological issues will be mainly addressed.

Keywords: Single molecule, Heterogeneous dynamics, Nanoscopy

Prof.
Nobuyuki TAMAOKI (RIES)

■Synthesis of light-driven molecular machines

Keywords: Motor protein, Photochromic compound, Liquid crystal

Prof.
Toshiyuki NAKAGAKI (RIES)

■Ethology of single celled organism viewed from physical equation of motion

Keywords : Mathematical modeling, Protozoa, Nonlinear dynamics, Biomechanics

Prof.
Vasudevan P. BIJU (RIES)

■Photonic molecules and nanomaterials for single-molecule detections, bio–imaging, and optical displays

Keywords : photonic molecules, nanomaterials, single molecule fluorescence, fluorescence sensors

Prof.
Hideharu MIKAMI (RIES)

■High-speed optical access to biological tissues by the integration of optics and informatics

Keywords : High-speed bio-imaging, Large-scale 3D fluorescence imaging, Image data analysis of biological tissues using deep learning, Optogenetic control of living organisms by lightwave engineering

Assoc. Prof.
Hitoshi AONUMA (RIES)

■Understanding real time adaptability of animal behavior

Keywords : Neurobiology, Synthetic neuroethology, Neuro-robotics

Assoc. Prof.
Yuna KIM (RIES)

■External stimuli-responsive molecules for advanced optical and mechanical functions

Keywords : photoresponsive chiral switch, electrochromism, liquid crystal, conjugated polymer

Assoc. Prof.
Yasuaki KOBAYASHI (RIES)

■Study of collective oscillations in biological systems

Keywords : collective oscillations, nonlinear dynamics

Assoc. Prof.
Katsuhiko SATO (RIES)

■Role of mechanical forces in complex phenomena in biological systems

Keywords : Mechanical models, Morphogenesis, Rheology

Assoc. Prof.
Yuzuru SATO (RIES)

■Random dynamical systems approaches to nonlinear complex phenomena

Keywords : complex systems, chaos, random dynamical systems, time series analysis

Assoc. Prof.
Atsushi SHIBUKAWA (RIES)

■Co-exsistence with scattering media by complex wavefront shaping

Keywords : scattering, biological imaging, optogenetics

Assoc. Prof.
Yuta TAKANO (RIES)

■Development of photofunctional molecular tools for understanding and controlling biological functions

Keywords : Photoinduced electron transfer, Luminescence sensor, Phototherapy, Carbon nanomaterials

Assoc. Prof.
Kenji HIRAI (RIES)

■Light-matter interaction for material chemistry

Keywords: Coordination Polymers, Nanomaterials, Phtochemistry

Assoc. Prof.
Hideyuki MITOMO (RIES)

■Development of functional devices using metal nanoparticles and soft matter

Keywords: Soft matter, Metal nanoparticles assemblies, Plasmonic devices

<Vice-Leader>
Prof.
Takehiko WADA (IMRAM)

■Novel strategy for ischemia cell specific oligonucleotide therapeutics with intracellular environmental condition responsible artificial nucleic acid

Keywords: Oligonucleotide therapeutics, Active Control

<Vice-Leader(sub)>
Prof.
Shin MIZUKAMI (IMRAM)

■Development of bioanalytical technology based on functional molecular probe design

Keywords: Bioimaging probes, Chemical biology, Photofunctional molecules

Prof.
Kenji INABA (IMRAM)

■Structural and mechanistic basis of cellular systems involved in protein quality control

Keywords: Protein quality control, Redox, Molecular chaperone, X-ray crystal structure analysis

Prof.
Shunichi SATO (IMRAM)

■Laser application for material science

Keywords: Photonics, Vector beam, Intense laser

Prof.
Satoshi TAKAHASHI (IMRAM)

■Dynamics of protein folding and function based on single molecule fluorescence spectroscopy

Keywords: Dynamics, Protein folding, Single Molecule Spectroscopy

Prof.
Masahiko TAKAHASHI (IMRAM)

■Towards investigation of the origins of molecular functions by developing methods to visualize electron motion in matter

Keywords: Electron Compton scattering, Electron momentum spectroscopy, Momentum space wave function

Prof.
Fumi NAGATSUGI (IMRAM)

■Development of the functional molecules for regulation of gene expression

Keywords: Antisense, Reactive oligonucleotide, miRNA

Prof.
Eriko NANGO (IMRAM)

■Quantum beam-based analysis of protein structural dynamics and its application to molecular control

Keywords: Protein structure, protein dynamics, X-ray free electron lasers, serial femtosecond crystallography

Prof.
Akihide HIBARA (IMRAM)

■Nano-microfluidic analytical devices and microscopy

Keywords : Nanoflluidics, Microfluidics, Light scattering, Liquid ingterfaces

Prof.
Atsushi MOMOSE (IMRAM)

■Visualization of biomedical materials with X-ray phase imaging

Keywords : X-ray, Phase contrast, Tomography

Prof.
Wataru YASHIRO (IMRAM)

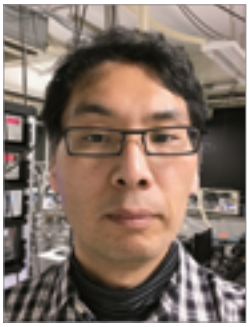
■Dynamics visualization using high-speed 4D X-ray tomography

Keywords : X-ray, Imaging, Dynamics, Elastography

<Vice-Leader(sub)>
Prof.
Hiroshi UEDA (iirCLS)

■Developing novel diagnostic systems by protein modification and split enzymes

Keywords : Fluorescence Quenching, Luciferase, Protein-Protein Interaction



Prof.
Shun-ichi ISHIUCHI (iirCLS)

■Elucidation of molecular recognition mechanism by bottom-up approach

Keywords : Molecular Recognition, Laser Spectroscopy, Mass spectrometry

Specially Appointed Professor
Toshiharu Suzuki (iirCLS)

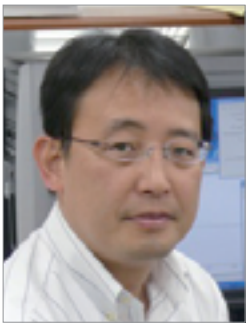
■Analysis of power-generation and regulation mechanisms of energy-conversion proteins

Keywords : bioenergetics, energy conversion, motor protein, F1-ATPase, FoF1-ATP synthase

Prof.
Kan TANAKA (iirCLS)

■Development of tetrapyrrole sensory devices toward the control of cell processes

Keywords : Tetrapyrrole, Organelle, Cell proliferation



Prof.
Hiroyuki NAKAMURA (iirCLS)

■Control of Biofunctions Using Photosensitizing Molecules and Application to Medicinal Chemsitry

Keywords : Protein modification, Photosensitizer, Anticancer drug design

Prof.
Nobuhiro NISHIYAMA (iirCLS)

■Development of smart diagnostic and therapeutic systems based on synthetic functional polymers

Keywords : DDS, Nanomedicine, Functional polymer, Imaging

Prof.
Toru HISABORI (iirCLS)

■Functional Analysis of Redox-Regulated Biological Systems

Keywords : Photosynthesis, Redox regulation, Bioenergetics, ATP synthase

Prof.
Michito YOSHIZAWA (iirCLS)

■Functional molecular capsules with polyaromatic panels

Keywords: assembly, capsule, polyaromatic, recognition

Assoc. Prof.
Tetsuya KITAGUCHI (iirCLS)

■Development of biosensors based on fluorescent proteins

Keywords: Fluorescent protein, Cell Signaling, Biosensor

Assoc. Prof.
Ken-ichi WAKABAYASHI (iirCLS)

■Photomovement in the green algae: from photoreception to ciliary regulation

Keywords: Chlamydomonas, Volvox, cilia, channelrhodopsin

Prof.
Shun' ichi KURODA (SANKEN)

■Development of In Vivo Pinpoint Drug Delivery System Inspired by the Viral Infection Machinery

Keywords: Virus, Nanocarrier, DDS

Prof.
Hiroaki SASAI (SANKEN)

■Development of Novel Enantioselective Reactions

Keywords: Multi-functional Catalyst, Enantioselective Catalyst, Domino Reaction, Helicenes

Prof.
Masateru TANIGUCHI (SANKEN)

■Development of bio-nanodevices using single-molecule analysis

Keywords: Single Molecular Science, Single Molecule Analysis, Biomolecules

Assoc. Prof.
Satoshi OKADA (iirCLS)

■Development of magnetic nanoprobes for imaging and controlling biological functions

Keywords: Molecular imaging, nanomaterials, chemical biology

Assoc. Prof.
Yutaka MIURA (iirCLS)

■Development of novel biomaterials by using well-defined macromolecules

Keywords: polymer, nano-biotechnology, polymer-drug discovery, controlled release

Prof.
Kunihiko NISHINO (SANKEN)

■Development of new strategies to tackle infectious diseases

Keywords: Multidrug resistance, Antimicrobial chemotherapy, Systems biology

Prof.
Kazunori KOMATANI (SANKEN)

■Robot dialogue system based on speech information processing technology

Keywords: Speech recognition, Dialogue system, Humanoid robot, Multimodal information processing

Prof.
Takayoshi SUZUKI (SANKEN)

■Chemical biology and medicinal chemistry targeting epigenetics

Keywords: Epigenetics Inhibitor Chemical Biology Medicinal Chemistry

Prof.
Takeharu NAGAI (SANKEN)

■Development and application of fluorescent and chemiluminescent protein for bioscience research

Keywords: Fluorescent protein, Chemiluminescent protein Bioimaging

Prof.
Masayuki NUMAO (SANKEN)

■Artificial intelligence and visualization for the diagnosis of fuel cells and rechargeable batteries

Keywords: Machine learning, Acoustic emission, Fuel cell

Prof.
Yasushi MAKIHARA (SANKEN)

■Video-based gait analysis for medical diagnosis assistant and health management

Keywords: Gait, computer vision, dianosis assistant, health management

Prof.
Yasushi YAGI (SANKEN)

■Biomedical image analysis and Computer Aided Diagnosis/Detection

Keywords: Computer Vision, Pattern Recognition, Cell, Dual Task, Colposcope

Prof.
Takeyuki SUZUKI (SANKEN)

■Development of environmentally benign oxidation for the catalytic asymmetric synthesis

Keywords: Iridium catalyst, Hydrogen transfer, Oxidation

Assoc. Prof.
Chikara DOHNO (SANKEN)

■Synthetic small molecules that regulate DNA/RNA higher order structures and functions

Keywords: DNA, RNA, Repeat sequence, Synthetic ligand, Photoswitch,

<Vice-Leader>
Prof.
Masaru TANAKA (IMCE)

■Design of biocompatible soft-biomaterials for medical devices

Keywords: Biocompatibility
Cell adhesion
Bio-interfaces
Water structure

Prof.
Satoru KIDOAKI (IMCE)

■Development of mechanobio-materials for cell manipulation

Keywords: Mechanobio-materials, Cell machanotaxis, Microelasticity patterning

Prof.
Mitsuru SHINDO (IMCE)

■Design and synthesis of useful organic molecules for life science

Keywords: Organic synthesis, Chemical biology, Bioactive compounds

Assoc. Prof.
Takahisa ANADA (IMCE)

■Design of biocompatible soft-biomaterials for medical devices

Keywords: Biocompatibility
Cell adhesion
Bio-interfaces
Water structure

Assoc. Prof.
Yusuke ARIMA (IMCE)

■Surface design of materials and living cells for biomedical applications

Keywords: Surface modification / Cell-material interaction / Cell-cell interaction

Assoc. Prof.
Hirohiko ISE (IMCE)

■Development of medical devices using carbohydrate-bearing polymers

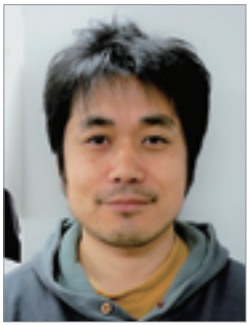
Keywords: Carbohydrates, Biomaterials, Cell biology

Assoc. Prof.
Arihiro KANO (IMCE)

■Study for tumor-associated macrophages and its development for cancer immunotherapy

Keywords: Cancer
Tumor-associated macrophage (TAM)
Immunotherapy

Alliance Research Promotion Group



Yasuyuki ARAKI
Assoc. Prof. (IMRAM)

■Development of novel transient spectroscopy and its application to the materials and life science

Keywords: Transient spectroscopy, Excited state, Circular polarized spectroscopy

Masahito UCHIKOSHI
Assoc. Prof. (IMRAM)

■Analysis of metal complexes in halide aqueous solutions

Keywords: Factor Analysis, UV/Vis absorption spectrum, Extended X-ray Absorption Fine Structure (EXAFS)

Makoto OHTSUKA
Assoc. Prof. (IMRAM)

■Improvement of properties for multi-functional thin films and development of novel devices

Keywords: Functional materials, Thin films, Materials processing, Thermophysical properties of high-temperature melts

Kazumitsu ONIZUKA
Assoc. Prof. (IMRAM)

■Development of functional molecules acting on target nucleic acids

Keywords: RNA, functional molecules, alkylation, rotaxane

Hiroshi KADOKURA
Assoc. Prof. (IMRAM)

■Studying protein folding mechanisms in the ER for biotechnology and medicine

Keywords: Secretory proteins, Endoplasmic reticulum, Disulfide bond, Protein production

Yuichi KOZAWA
Assoc. Prof. (IMRAM)

■Applications of spatial control of phase and polarization of light waves

Keywords: Laser, Optics, Imaging, Microscopy

Kazunobu KOJIMA
Assoc. Prof. (IMRAM)

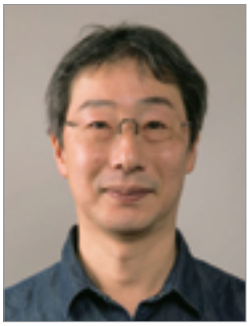
■Novel optical applications of highly efficient semicondcutors

Keywords: Luminescence refrigeration, Solar-blind LED-based optical wireless communications, Optical characterization

Rayko SIMURA
Assoc. Prof. (IMRAM)

■Synthesis and X-ray structure analysis of new multinary metal oxides
and related materials

Keywords: Multinary metal oxides, Crystal structure analysis, Anomalous X-ray
diffraction (AXS)



Toshitaka MATSUI
Assoc. Prof. (IMRAM)

■Structure and mechanism of metalloenzymes for catabolism of biological pigments

Keywords : Heme, Oxygen activation, Reactive intermediate

Susumu YAMAMOTO
Assoc. Prof. (IMRAM)

■Catalytic surface science opened by synchrotron radiation X-ray operando measurements

Keywords : X-ray, Synchrotron radiation, Operando, Catalyst

Noboru WATANABE
Assoc. Prof. (IMRAM)

■Electronic motion in molecules studied by electron scattering spectroscopy

Keywords : Molecular science, Electron scattering, Electronic structure

Zentaro AKASE
Lecturer (IMRAM)

■Multidisciplinary analysis of electromagnetic field at nanometer scale

Keywords : Electron holography, Electromagnetic field, In situ observation

Masaki MATSUBARA
Lecturer (IMRAM)

■Development of Liquid-crystalline Organic-inorganic Hybrid Nanoparticles

Keywords : Nanoparticles, Hybrid Materials, Self-organization, Liquid-crystalline

Kohei YOSHIMATSU
Lecturer (IMRAM)

■Synthesis of oxide films and development of functional properties

Keywords : Transition-metal oxides, Thin films, Metal-insulator transition, Electric devices

Yukihiro ITOH
Assoc. Prof. (SANKEN)

■Drug discovery study based on organic chemistry

Keywords : enzyme inhibitor, chemical biology, medicinal chemistry

Takafumi UEMURA
Specially Appointed Assoc. Prof. (SANKEN)

■Development of Flexible Organic Electronics

Keywords : Flexible Transistors
Organic Electronics
Large-Area Sensors

Yasuko OSAKADA
Assoc. Prof. (SANKEN)

■Development of intelligent photo-functional molecules and materials toward materials science and biology

Keywords : Photochemistry, nanomaterials, radiation chemistry

Kiyohiko KAWAI
Assoc. Prof. (SANKEN)

■Single-molecule analysis and diagnosis based on the single-molecule fluorescence measurement

Keywords : Single molecule, fluorescence, kinetics, blinking

Zhan JIN
Assoc. Prof. (SANKEN)

■Intense Laser-plasma interaction, laser wakefield acceleration, intense terahertz source development and applications

Keywords: High power laser, Laser acceleration, Terahertz

Hirotaka KOGA
Assoc. Prof. (SANKEN)

■Renovation of paper by using nanocellulose for functional innovation

Keywords: Nanocellulose, Green paper electronics, Paper fluidics

Tomohiro KOYAMA
Assoc. Prof. (SANKEN)

■Electrical, optical control of spintronics device and its utilization in an ultimate environment

Keywords: Spintronics, control of magnetism, ultimate environment

Tomoyo GOTO
Assoc. Prof. (SANKEN)

■Control of morphology, composition and functions of ceramic-based materials by the novel solution process

Keywords: Functional ceramics, Solution process, Biomaterials, Environmental purification

Tohru SUGAHARA
Assoc. Prof. (SANKEN)

■Study of materials interfaces, materials interconnection, and materials interactions, and device fabrication with materials integration

Keywords: materials integration,materials interfaces, materials interconnection, materials interactions

Koichi SUDOH
Assoc. Prof. (SANKEN)

■Dynamics of surface and interface morphology

Keywords: Surface Morphology, Crystal Grwoth

Shinobu TAKIZAWA
Assoc. Prof. (SANKEN)

■Green enantioselective synthesis for polyfunctionalized heterocycles

Keywords: Asymmetric Synthesis
Rare metal-free catalyst
Machine-learning

Ryu TAKEDA
Assoc. Prof. (SANKEN)

■Online model adaptation in speech information processing

Keywords: speech, signal, recognition, adaptation

Tomoya NAKAMURA
Assoc. Prof. (SANKEN)

■Optical coded imaging

Keywords: Coded imaging, Image reconstruction

Tsuyoshi NISHI
Assoc. Prof. (SANKEN)

■Identification of physiological function of orphan transporters and development of a drug that regulates the cell migration by modulating the transporter function

Keywords: Transporter, Lipid mediator, Cell migration,

Satoshi HARA
Assoc. Prof. (SANKEN)

■Explaining Decisions of Machine Learning Models

Keywords : Machine Learning, Artiricial Inteligence, ExplainableAI

Tomoki MATSUDA
Assoc. Prof. (SANKEN)

■Development of bioimaging technology with fluorescent and bioluminescent proteins

Keywords : Bioimaging, Fluorescent protein, Bioluminecent protein, Optogenetics

Yasuko MATSUBARA
Assoc. Prof. (SANKEN)

■Development of Real-time AI Technique for Nanoinformatics

Keywords : Real-time AI, Big Data Mining, Time-Series Analysis, Nanoinformatics

Asako MURATA
Assoc. Prof. (SANKEN)

■Exploring of small-molecule ligands that regulate RNA structures and functions

Keywords : ncRNA, small molecule, RNA structure

Seiji YAMASAKI
Assoc. Prof. (SANKEN)

■Building a new coexistence relationship between humans and bacteria by developing a new control method

Keywords : Multidrug resistant bacteria, Antibiotics, Gut microbiome

Jinfeng YANG
Assoc. Prof. (SANKEN)

■Beam physics, Electron microscopy

Keywords : Electron microscopy, Ultrafast electron microscopy, Femtosecond electron pulse, Structural dynamics

Hideto YOSHIDA
Assoc. Prof. (SANKEN)

■Atomic-scale structural analysis of nanomaterials in working conditions

Keywords : Environmental transmission electron microscopy, Nanomaterials, Nanodevices

Atsushi IIZUKA
Assoc. Prof. (IMRAM)

■Mineral Carbonation of Carbon Dioxide Using Alkali Wastes

Keywords : Carbon capture and utilization,Mineral carbonation,Water treatment

Kiyoto KAMAGATA
Assoc. Prof. (IMRAM)

■Development of measurements, control, and design for protein/DNA system

Keywords : DNA-binding protein,Function,Single-molecule measurement,Drug discovery

Sohei SUKENAGA
Assoc. Prof. (IMRAM)

■Understanding of physical properties and structure for molten oxides and their glasses

Keywords : Non-crystalline materials, Mechanical properties, Interfacial phenomena, Structural characterization

The researchers listed here are some. For alliance joint research participants, Please refer to the researcher database. http://star-five.net/

About Logo:

The Dynamic Alliance (Five-Star Alliance) has established a logo mark consisting of five colored-parts, which is based on "dynamic research collaboration and dissemination" as a motif. Four patterns of simple logos (color and monochrome with and without abbreviations “Five-Star”) and corresponding four sets of mark and a name have been prepared. The NJRC has also established consistent logo marks at the same time.

ロゴマークについて

全国に跨る大学５研究所がネットワークを構築して実施している「人・環境と物質をつなぐイノベーション創出ダイナミック・アライアンス」では、「ダイナミックな研究連携とその発信」をモチーフとして、５色のパーツからなる一貫性のある図形で表現したロゴマークを制定した。シンプルな図形および略語（Five-Star）からなるパターン（カラーおよびモノクロ）と、名称（文字）との組み合わせからなるものであり、同時に「物質・デバイス領域共同研究拠点」でも一貫性のあるロゴマークを制定している。

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