



# Inspiring Creativity

Institute for Integrated Cell-Material Sciences  
Kyoto University

**MATERIALS SCIENCE**

**INTEGRATION**

**CELL BIOLOGY**



The  
Director's  
Vision:



# Integrating Cell Biology and Materials Science

**I** Susumu Kitagawa Director

Kyoto University excels in cell biology and materials science. At iCeMS, we are transcending the boundaries between these fields and exploring the intersection of life and matter, where we are pioneering a new field of research, integrated cell-materials science.

## Cultivating New Fields of Research

Some may argue that when researchers with different perspectives and expertise are brought together, they have difficulties sharing information and developing common goals. By sharing and accepting different views and opinions, iCeMS researchers not only overcome these difficulties, but turn them into opportunities for advancing the goals of the Institute. Now, entirely new ways of thinking, and values are being realized. In this diverse and creative environment, we are focusing on developing the following areas of study.

## Major Pillars of Research

1

Understanding and regulating cellular function using novel materials and technologies

It is through the self-organization and interaction of a great number of chemical substances that cells maintain biological activity. In order to understand the mechanisms of cellular functions, we first prepare the necessary chemicals and materials required for analysis. We then utilize the knowledge gained through analysis to create chemicals which can regulate cellular functions.

2

Creating functional materials inspired by cellular mechanisms

Cells sustain life by separating, selecting, concentrating, transforming, detecting and releasing various molecules. Through a deep understanding of cellular functions and mechanisms, we wish to create smart materials that out-perform the systems they were inspired by and apply them in the health, environmental, and energy sectors.



# Researchers →

## ☐Principal Investigators (PIs)



**Daishi Fujita**  
Associate Professor  
Supramolecular  
Chemistry,  
Chemical Biology

**Aiko Fukazawa**  
Professor /  
Deputy Director  
Physical Organic  
Chemistry,  
Organic Synthesis

**Shuhei Furukawa**  
Professor  
Chemistry of  
Molecular Assemblies

**Satoshi Horike**  
Associate Professor  
Materials Chemistry

**Ken-ichiro Kamei**  
Associate Professor /  
PI Board Chair  
Microengineering,  
Stem Cell Research



**Mineko Kengaku**  
Professor /  
Analysis Center Director  
Developmental Biology  
of Nervous System

**Susumu Kitagawa**  
Distinguished  
Professor / Director  
Inorganic Chemistry;  
Chemistry of  
Coordination Space

**Kazuki Nakanishi**  
Program-Specific  
Professor  
Sol-Gel Science,  
Porous Materials

**Ganesh Pandian  
Namasivayam**  
Junior Associate  
Professor  
Bio-Inspired Therapeutics,  
Epigenetics

**Daniel Packwood**  
Junior Associate  
Professor  
Applied Mathematics and  
Theoretical Chemistry



**Easan Sivaniah**  
Professor  
Clean Technology

**Kuniyisa Sugimoto**  
Program-Specific  
Associate Professor  
X-ray Crystallography,  
Synchrotron Science

**Jun Suzuki**  
Professor /  
Deputy Director  
Medical Biochemistry,  
Cell Membrane Biology

**Fuyuhiko Tamaroi**  
Program-Specific  
Professor  
Nanoparticles and  
Cancer Therapy

**Yuichi Taniguchi**  
Professor  
Biophysics,  
Systems Biology



**Kazumitsu Ueda**  
Program-Specific  
Professor / Research  
Administrative Director  
Agricultural Chemistry

## ☐The Hakubi Project

**Kohei Kusada**  
Program-Specific  
Associate Professor  
Nanomaterials,  
Inorganic Chemistry

## ☐iCeMS Kyoto Junior Fellow

**Thidarat Imyen**  
Assistant Professor  
Material Chemistry and  
Heterogeneous Catalysis

## ☐Adjunct Principal Investigators

**Ryu Abe**  
Artificial Photosynthesis,  
Solar Hydrogen Production,  
Photocatalysts

**Peter Carlton**  
Meiosis, DNA Damage and  
Repair, Epigenetics, Superrreso-  
lution Microscopy

**Itaru Hamachi**  
Chemical Biology, Supramolecu-  
lar Biomaterials

**Hiroshi Imahori**  
Artificial Photosynthesis, Organic  
Photovoltaics

**Hiroshi Kageyama**  
Solid State Chemistry

**Hiroshi Kitagawa**  
Solid-state Chemistry, Electron-  
Proton Coupled System

**Michiyuki Matsuda**  
Bio-Imaging, Visualization of  
Inter- and Intra-Cellular Signal  
Transduction

**Yasuo Mori**  
Molecular Biology

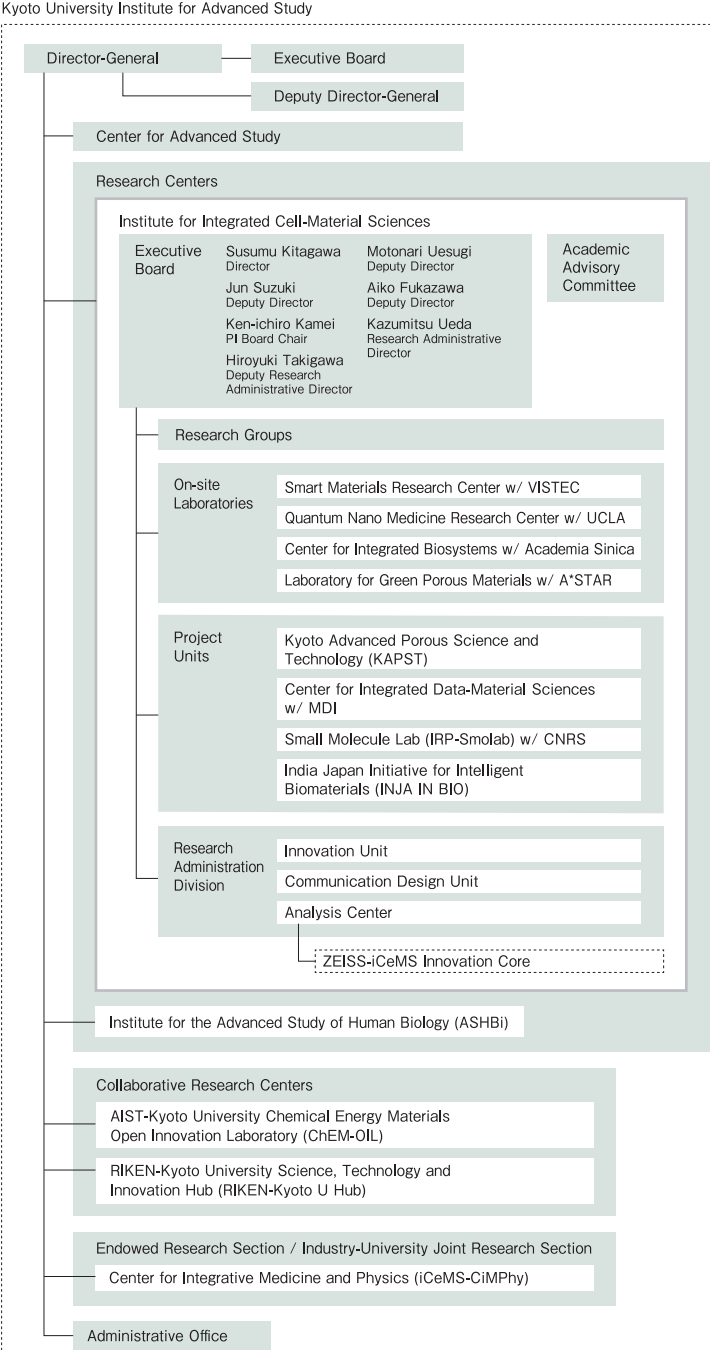
**Hiroshi Sugiyama**  
Chemical Biology, DNA-Based  
Smart Biomaterial Design

**Koichiro Tanaka**  
Terahertz Optical Science

**Motomu Tanaka**  
Medical Physics, Soft Matter  
Physics

**Motonari Uesugi**  
Chemical Biology

Organization  
Chart



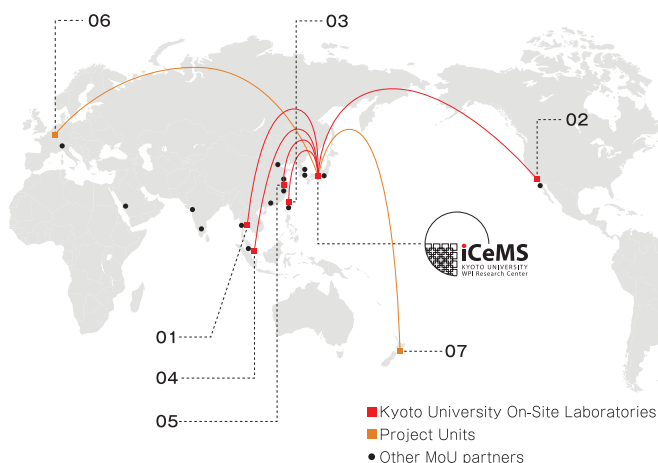
## Features



## Academic Cooperation &amp; Exchange

## International Partnership

iCeMS pursues world-leading research through active cooperation with many overseas universities and organizations. Under the Kyoto University On-Site Laboratory Initiative, iCeMS has established five locally managed centers in alliance with overseas research partners. Moreover, iCeMS has launched the Small Molecule Lab in cooperation with the French National Center for Scientific Research (CNRS) and other collaborating partners. Furthermore, research partnership agreements have been made with 18 institutions across the globe.



## Kyoto University On-site Laboratories

01 Smart Materials Research Center  
(VISTEC, Thailand)

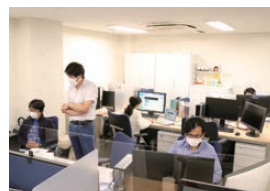
The Smart Materials Research Center focuses on creating new materials through chemistry for solving the issues of energy and the environment.



Smart Materials Research Center

02 Quantum Nano Medicine  
Research Center  
(CNSI at UCLA, USA)

QNM Center is established at Kyoto University as an inbound-type on-site lab. We aim to open up a new field of research emerging from the convergence of Quantum Physics and Nano-medicine.



Researchers of Quantum Nano Medicine Research Center

### 03 Center for Integrated Biosystems (Academia Sinica, Taiwan)

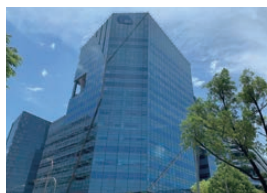
The Center for Integrated Biosystems aims to explore the new field of biomedical sciences based on unbiased screening.



Academia Sinica

### 04 Laboratory for Green Porous Materials (A\*STAR-IMRE, Singapore)

The Laboratory for Green Porous Materials aims to conduct research on environmental catalysis using porous materials and develop new fields that contribute to the environment.



A\*STAR-IMRE

### 05 Kyoto University Shanghai Lab (Fudan University, China)

Kyoto University Shanghai Lab is promoting cutting-edge joint research in chemistry and exchanging human resources between Kyoto University and universities and research institutions in the Shanghai area.

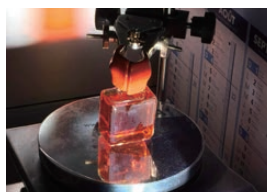


At Shanghai Jiao Tong University's Shared Equipment Center

## Project Units

### 06 Small Molecule Lab (CNRS, France)

Small Molecule Lab (Smolab) is an international research laboratory for developing hybrid porous materials (crystals, glass, and gels) for energy and environmental applications.



Photocatalytic reaction system

### 07 Center for Integrated Data-Material Sciences (MacDiarmid Institute, New Zealand)

The Center for Integrated Data-Material Sciences will deepen the paradigm of data-driven materials science while aiming to establish a novel materials development process to accelerate the discovery of new materials for energy, environment, and medicine.



iCeMS-MDI online workshop held to strengthen mutual understanding and explore areas for future collaboration

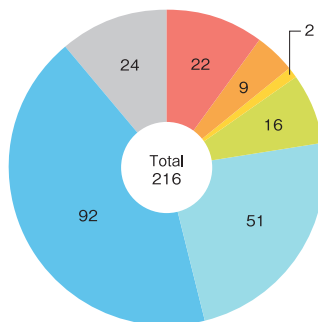
Facts and Figures



□ All Staff

Professor	22
Associate Professor	9
Senior Lecturer	2
Assistant Professor	16
Research Associate	51
Research Support Staff	92
Administrative Staff	24

As of March 2021

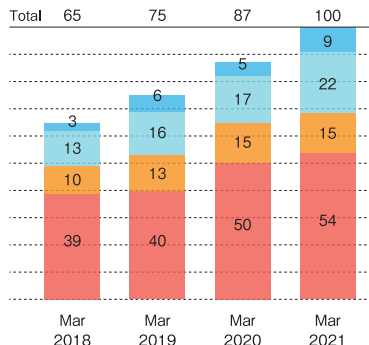


□ Researchers

Overseas Female
Overseas Male
Japanese Female
Japanese Male

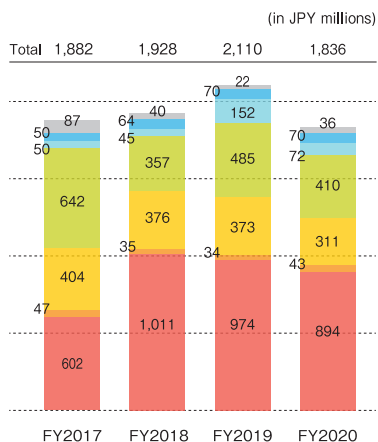
Researchers from Overseas

China	South Korea
France	Spain
India	Syria
Iran	Thailand
Ireland	Turkey
New Zealand	UK
Oman	USA



□ Finance

Others
Donations
Subsidies
Commissioned research funds, etc.
Grant-in-Aid for Scientific Research
WPI Academy Fund
Basic Operating Funds



Support  
System

Ensuring a Top-Notch  
Research Environment

Research Promotion



At iCeMS, expert teams provide support to accelerate “brain circulation” among domestic and international research institutions, expand and consolidate international networks of scientists in relevant fields, and return the research results to society. We aim to create and spread a world-class research environment by sharing our experience both within Kyoto University and with other universities and research institutes nationwide, through the strong cooperation of other WPI institutes.

Innovation Unit

- Coordinating international research agreements
- Managing intellectual property rights, patents, and industrial applications
- Developing strategies to gain research grants
- Fundraising

Communication  
Design Unit

- International public relations and communications
- Organizing scientific outreach events
- Online and offline communication of scientific topics
- Activating international exchange of researchers

Analysis  
Center

- Maintaining and operating shared equipment and facilities
- Providing advice and guidance for experimental design
- Hosting hand-on training sessions and seminars
- Ensuring a safe experimental environment

Timeline



2007 Sep	iCeMS is selected for the World Premier International Research Center Initiative (WPI) by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT).
Oct	iCeMS is established at Kyoto University with Prof Norio Nakatsuji as founding director.
2008 Jan	The Center for iPS Cell Research and Application (CiRA) is established under the auspices of iCeMS with Prof Shinya Yamanaka as founding director.
2010 Apr	The Center for iPS Cell Research and Application (CiRA) is re-established as a sister institute to iCeMS with Prof Shinya Yamanaka as founding director.
2012 Oct	Prof Shinya Yamanaka wins the Nobel Prize in Physiology or Medicine.
2013 Jan	Prof Susumu Kitagawa succeeds Prof Nakatsuji as director.
2017 Apr May	iCeMS becomes a research center of Kyoto University Institute for Advanced Study. iCeMS gets certified as a WPI Academy center by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT).



## More about iCeMS



Information on iCeMS is always available on its website and daily updated social media such as Twitter, Instagram, Facebook, and YouTube. Please check them out for news, interviews, and seminar information, as well as the details of iCeMS research, researchers, and activities.



[www.icems.kyoto-u.ac.jp/en/](http://www.icems.kyoto-u.ac.jp/en/)



@Kyoto.Univ.iCeMS  
 @iCeMS\_KU  
 @iCeMS\_KU  
 @iCeMSpr

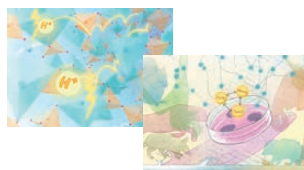
### ☐ iCeMS Leader Interview Video Series

An interview video series where iCeMS researchers share their passion about research and their unique perspectives.



### ☐ Research News (Press Release)

Research results at iCeMS are presented in an understandable way with attractive illustrations.



### ☐ Newsletter iCeMS Our World, Your Future

Learn more about iCeMS research through interviews with researchers and research support staff.



### ☐ Seminar and Symposium Information

Information about international symposia and iCeMS seminars are available on the iCeMS website.



- iCeMS Research Scope
- iCeMS Frontrunners
- First Author Interview
- The Other Half of iCeMS

## A Call for Support



## iCeMS Fund

iCeMS is making outstanding, creative achievements at the boundary between cell biology and materials science. Your encouragement and support are an important resource to ensure the Institute can continue this work. iCeMS is seeking donors who support us in our challenges of navigating the uncharted waters of science. Anyone can donate to the iCeMS Fund, including individuals, and corporate and non-corporate entities. Why don't you join us on the journey to a new horizon?

Donations to the iCeMS Fund can be made from here (QR code).  
<https://www.icems.kyoto-u.ac.jp/en/support/>


☐ Your donations are used for the following purposes:

- |   |   |
|---|---|
| (1) Facility Administration <ul style="list-style-type: none"> <li>● Employment of researchers and staff</li> <li>● Operation and management of the facility</li> </ul> | (3) Research Funding <ul style="list-style-type: none"> <li>● Financial support for transdisciplinary projects</li> </ul>   |
| (2) Human Resource Development <ul style="list-style-type: none"> <li>● Overseas exchange and training of junior scientists</li> </ul>                                  | (4) Public Relations <ul style="list-style-type: none"> <li>● Open seminars and lectures</li> <li>● Online and print publications of research findings</li> </ul> |

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 The terms and conditions for the use of donations were revised in March 2021 to include facility management costs.

☐ Advantages of Donation

## [ Tax Deduction ]

Donations to Kyoto University, including iCeMS, are tax deductible.

## [ Expression of Gratitude and Appreciation ]

iCeMS shows donor appreciation in multiple ways, including:

- A thank-you letter from the Director
- Recognition on the list of supporters (donors can remain anonymous if they prefer)
- Invitations to the iCeMS thank-you reception and open laboratory tours.

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 To read more about how you benefit from donating to Kyoto University, please visit the Kyoto University Fund at: <https://www.kikin.kyoto-u.ac.jp/en/>.

