

# Progress Plan for Maintaining Academy Center Certification

## World Premier International Research Center Initiative (WPI)

Host Institution	Kyoto University
Research Center	Institute for Integrated Cell-Material Sciences (iCeMS)
Host Institution Head	Minato Nagahiro
Center Director	Uesugi Motonari
Administrative Director	Ueda Kazumitsu

Please prepare this Progress plan based on your application for WPI Academy. Summarize the Center's future plans with regard to the following 8 items **within five A-4 pages**. (Also fill out the appendices at the end of this form.)

### 1. Overall Image of Your Center

\* Describe the Center's overall image including its identity.

Chemistry and cell biology are the research flagships of Kyoto University, and WPI-iCeMS will lead the harmonizing of these two fields, involving faculty and students from across the university. Through this coordinated fusion, we endeavor to understand the intracellular self-assemblies at the boundary between life and matter and inspire the innovation of functional self-assembling materials. iCeMS is a test bed for Kyoto University, and as such will lead the way as a proof-of-concept for university-wide planned reforms and next-generation research laboratories. We will continue to collaborate with Kyoto University to share the results of our experiments throughout the organization. Particular emphasis will be placed on globalization, equipment sharing through the Analysis Center, innovation through start-ups, and diversity and inclusion. The Research Administration Division (RAD) of iCeMS plays an important role in these test-bed endeavors and in promoting the WPI Academy program. After iCeMS was certified as a "WPI Academy" in 2017, young talents have been recruited as PIs from outside iCeMS. The average age of eleven core PIs is 44.7.

### 2. Mid- to Long-term Research Objectives and Strategies

\* Describe new challenges in the Center's research objectives and plans after FY 2020.

\* Describe your future research strategy and plans and research organization including your line-up of Principal Investigators, and your outlook for fostering and securing the next generation of researchers.

Life is, in essence, made of chemicals. However, chemicals are not life. At what stage do chemical substances begin to exhibit "life-like" characteristics? At iCeMS, we believe that self-assembly lies at the core of the division between chemicals and life. There are many self-assembling structures in cells that maintain life. Principal examples include membrane structures, membraneless organelles (liquid-liquid phase separators), cytoskeleton, and chromatin. At iCeMS, we aim to understand the self-assembly inside of cells and use that wisdom to create innovative self-assembling materials to solve global problems. To achieve our goals, we will bring together researchers - inside and outside the university, domestic and international, young and old, male and female - whose work is related to self-assembly in cell biology, materials science, chemical biology, synthetic chemistry, and computational science. Through this, we hope to achieve both diversity and focus.

One of our most important mid- to long-term strategies is the further facilitation of iCeMS' collaborative laboratories with overseas research institutes. The "**Smart Materials Research Center**" with Vidyasirimedhi Institute of Science and Technology (VISTEC) in Thailand, which aims to synthesize new materials inspired by the biological reactions to solve environmental and energy problems. Looking to the future, **Horike** focuses on the education of doctoral students and also works on the technical needs of

the Thai chemical companies that are collaborating with VISTEC. At the “**Center for Integrated Biosystems**”, collaborative research with Academia Sinica researchers is on-going. The joint research is based on unbiased screening to identify new molecules which regulate and control important physiological reactions, which is **Suzuki**'s specialty. The **iCeMS Taiwan Office**, which was established in 2019, is working to deepen exchanges between universities in Taiwan and Kyoto University. In the “**Kyoto University Shanghai Lab**”, **Uesugi** is conducting advanced collaborative research in the three fields of chemical biology, new materials, and energy conversion between Shanghai area universities, and utilizing this On-site Lab to give lectures and interviews to recruit graduate students from top-tier Chinese schools. The “**Quantum Nano Medicine Research Center**” was established by cross-appointed professor **Tamanoi** for a collaboration between iCeMS and California Nano-Systems Institute (CNSI) of UCLA. The aim of the center is to highlight the recent emergence of a new field of science created by the convergence of quantum beam research and nanomaterial studies. It is now operated as an in-bound type laboratory with plans to develop this center into a cross-bound type by establishing a laboratory in UCLA. The “**Center for Integrated Data-Material Sciences**” was established by **Packwood** and **Fukazawa** to deepen the paradigm of data-driven materials science while aiming to establish a next-generation materials development process. Towards this end, it combines the expertise in material informatics of iCeMS with the expertise in physical property characterization of the MacDiarmid Institute in New Zealand. The “**Laboratory for Green Porous Materials**” was established by **Kitagawa** with the Institute of Materials Research and Engineering (IMRE) of A\*STAR in Singapore. This laboratory aims to conduct research on environmental catalysis using porous materials and develop new fields that contribute to the environment. The “**Small Molecule Laboratory (Smolab)**” is an International Research Project (IRP) with the French National Centre for Scientific Research (CNRS) established by **Furukawa** which aims to synthesize new materials inspired by biological reactions to solve environmental and energy problems. In 2022, two international laboratories started as iCeMS Project Units. One is the “**India Japan Initiative for Intelligent Biomaterials (INJA IN BIO)**”, established by **Namasivayam**. It is a collaborative research initiative that brings together experts from different disciplines from India, Japan, Switzerland, the United States of America and Malaysia to address the overarching aims such as developing omics-directed intelligent biomaterials. The other is the **SUSTech-Kyoto University Advanced Energy Materials Joint Innovation Laboratory (SKAEM-JIL)**, established by Kitagawa. It is promoting cutting-edge joint research in materials science for advanced energy applications and exchanging human resources between Southern University of Science and Technology in China and Kyoto University. These ten collaborative projects promote international brain circulation and strengthen and energize the interdisciplinary research of iCeMS.

### **3. Management System of the Research Organization**

\* Describe the system of organizational management via which the Center will execute the above-described research strategy and plans.  
\* In Appendix 1-3, list the Principal Investigators, enter the number of Center personnel (researchers, research-support staff, and administrative staff), and provide a diagram of the Center's organizational management system.

In order to make prompt decisions, iCeMS has implemented a top-down decision-making process. The **Director** is empowered with strong decision-making authority which is supported by the **Executive Board**, which consists of the Director, Deputy Directors, PI Board Chair, Research Administrative Director, and Deputy Research Administrative Director. In the **PI Meeting**, the decisions are shared with PIs and researchers, while management tasks suggested by PIs are brainstormed and brushed up. iCeMS has set up five committees comprised of PIs, RAD members, and administrative staff who devise improvement plans and solutions to various problems: Facilities Management Committee, Outreach Committee, Fundraising Committee, International Laboratories Steering Committee, and COVID-19 Task Force Committee. This year, a sixth, the Diversity and Inclusion Committee was established to create a research environment that is inclusive for a diverse group of researchers.

#### **4. Plan for Promoting the International Circulation of World's Best Brains**

\* Describe your policy and concrete plan for promoting the international circulation of the world's best brains, which is an important function of the WPI Academy.

##### **4-1. Strategic Recruitment of Talented International Students and Young Researchers**

The number of international students enrolled in Kyoto University's graduate schools has increased. To continue this trend and secure top-tier students and researchers, iCeMS will pursue further strategic recruitment activities in collaboration with the Division of Graduate Studies.

##### **4-2. International Symposia Held for Brain Circulation**

iCeMS actively hosts international research meetings both in Japan and abroad. Most are currently held as hybrid on-site and online meetings to allow for both direct interaction and a diverse audience. This provides a place not only for the young researchers of iCeMS to expand their career opportunities through presenting their work, but also for researchers from different disciplines to gather and exchange ideas to acquire new insights. iCeMS places special emphasis on the opportunities to hold international symposia with the partner institutes of collaborative projects. Using new tools which promote virtual interaction such as Gather and SpacialChat iCeMS is creating a new model of a symposium combining the advantages of real meetings and virtual ones.

##### **4-3. iCeMS Retreats with Invited Overseas Prominent Researchers**

iCeMS holds its annual retreats for the purpose of sharing on-going, unpublished multidisciplinary research activities. iCeMS is planning to invite several overseas cutting-edge scientists to encourage iCeMS young researchers.

#### **5. Plan for Disseminating the WPI Program Achievements**

\* Describe your policy and concrete plan for disseminating WPI center achievements both within the host institution and to other universities, especially their experience and know-how accumulated on establishing top world research institute and advancing system reforms.

##### **5-1. Global Development through On-site Labs**

iCeMS operates Kyoto University On-Site Labs in six locations around the world. These on-site labs will serve as a test bed for globalization of Kyoto University. In addition to joint research and equipment sharing, the laboratories can serve as experimental hubs for student recruitment, graduate school admissions testing, and donation fund acquisition. As a test bed, iCeMS collaborates with two university-wide divisions: the International Strategy Office (ISO-KU) and the Division of Graduate Studies.

##### **5-2. Promotion of Diversity, Equity & Inclusion (DE&I)**

At iCeMS, the percentages of female and foreign faculty members are higher than the percentage of female faculty members in natural science departments within the university and are closer to the situation in Western countries. In order to address the disparity in numbers as well as illuminating issues such as unconscious bias, iCeMS will lead the university in raising DE&I to Western levels.

##### **5-3. Cooperation with URA in Kyoto University**

Kyoto University Research Administration Center (KURA) facilitates an environment where researchers can concentrate on their research activities by supporting the planning and operation of research projects and then working to return the benefits of research to society. The iCeMS RAD cooperates with KURA to support grant applications by iCeMS PIs and also to share the RAD's experience and knowledge with other departments in the university. Moving forwards, several new initiatives by iCeMS such as the promotion of internal communication will be shared with KURA to suggest to other departments in Kyoto University.

##### **5-4. Analysis Center**

The iCeMS Analysis Center continues to serve as a core facility model for Kyoto University. The Materials Analysis Unit and Bioanalysis Unit maintain facilities and cutting-edge analytical instruments both for materials science and for cell biology and also offers workshops and hands-on training to researchers. The center includes the "**Zeiss-iCeMS Innovation Core**", where the development of new bio-imaging techniques has been conducted in collaboration with Carl-Zeiss. The center's Shared Equipment Support

Unit manages shared use across Kyoto university. This center makes it possible for junior PIs to set up their research environment without their own equipment. Through these initiatives, the center is expected to function as a hub for domestic and overseas instrumental analysis in cell-material science.

#### **5-5. Innovation through the Establishment of Start-ups**

For the future development of iCeMS, it is necessary to give back to society through start-ups. The Innovation Unit of the iCeMS RAD will test experimental methods in cooperation with the Office of Society Academia Collaboration for Innovation (SACI) of Kyoto University.

#### **5-6. Cooperation with Other WPI Centers**

Since iCeMS covers a wide range of scientific fields, iCeMS has a high potential to promote collaboration with researchers at other WPI centers. In addition to collaboration by individual researchers, iCeMS is planning to have opportunities of joint symposia with other WPI centers.

Outreach activities will also be collaborative with other WPI centers. iCeMS regularly takes part in exhibition booths at WPI Science Symposia. iCeMS also presents a booth at the European Materials Research Society (E-MRS) conference to introduce the research environment in Japan and WPI to materials scientists from all over the world.

### **6. Plan for Sustaining the WPI Brand**

\* Describe your plan for sustaining and enhancing the WPI brand.

#### **6-1. Research Administration Division**

The iCeMS Research Administration Division (RAD) is responsible for promoting international brain circulation, managing outreach activities, and fundraising. The RAD also plays a role in implementing various new efforts to improve the environment for researchers and staff at the university. Successful cases are to be recognized as the achievements of the WPI Academy and will be shared with other WPI centers as well as other departments in Kyoto University.

#### **6-2. Publication of Brochures and Newsletters**

iCeMS publishes brochures with general information on the institute, and the newsletter "Our World Your Future" (two or three times a year), all in both English and Japanese, electronic and print media to reach high school students and the general public.

#### **6-3. International and Domestic Dissemination of Research Results**

iCeMS actively disseminates research results both domestically and internationally. Each press release is distributed along with an artistic and approachable illustration to represent the news. Using illustrations increases the visibility of press releases on science press release portals such as Asia Research News and EurekAlert!, and web-based international news sites tend to share the story with the image provided with the press release. An attractive image makes the news easier to be shared and featured.

#### **6-4. Posting Information through Social Media**

iCeMS makes frequent postings to its social media: Facebook, Twitter, YouTube, and Instagram. iCeMS' postings are viewed by many people and receive active responses. iCeMS is also utilizing social media to acquire research resources, such as the recruitment of young researchers, donations, and opportunities for collaboration. To boost international recognition and recruitment, iCeMS manages a targeted website and Twitter account to reach overseas young researchers and graduate students.

#### **6-5. Activation of Fundraising**

iCeMS actively accepts donations through the "iCeMS Fund", one of the Project Support Funds of Kyoto University, and through the "Yahoo! Internet Donations", a website well-known in Japan. These initiatives contribute to the increase in donations and the improvement of iCeMS visibility. Furthermore, to systematically build opportunities for funding from partner companies and large donations from benefactors, iCeMS has appointed an advisor to the director and has begun working with financial

institutions. From April 2021 to November 2022, iCeMS received approximately 130 million yen in large donations and is now implementing a systematic approach to building and sustaining long-term relationships with donors and further expanding donation channels.

## **6-6. Construction of Alumni Database**

iCeMS is building a database of alumni who are currently, or were formerly, members of iCeMS. The purpose is to centralize the iCeMS membership information and use it to expand donation and recruitment opportunities. We have been working to establish a system for database management and personal information protection, and we plan to begin exchanging of research resources with alumni.

## **7. Support by Host Institution**

\* Describe measures that the host institution is and will take to support and sustain your Center.

### **7-1. Support Policy of Host Institution to Sustain the Center**

To secure resources for operations and research activities of iCeMS, Kyoto University will continuously implement the following measures:

1. As a necessary financial measure for iCeMS' operation, the university will provide indirect costs associated with competitive grants to iCeMS.
2. The university will provide 12 positions and expenses for principal investigators (PIs).
3. The university will provide 10 young researchers.
4. The university will provide 9 full-time positions and expenses to support the administrative part.
5. The university will offer a research environment of the highest quality, with a total area of about 11,000 square meters and fully-equipped facilities for exclusive use.
6. The university will support maintenance cost for large-scale facilities and equipment.

### **7-2. Operation of On-site Laboratories**

The pursuit of "a flexible and dynamic approach to knowledge creation" is one component of Kyoto University's strategy as a Designated National University. As part of those efforts, the university is implementing an initiative to establish locally-managed "On-site Laboratories" in cooperation with overseas partner universities and research institutions. By the end of FY2021, Kyoto University has authorized a total of eleven centers for this project. Six of these are run by researchers belonging to iCeMS (Smart Materials Research Center, Kyoto University Shanghai Lab, Quantum Nano Medicine Research Center, Center for Integrated Biosystems, Center for Integrated Data-Material Sciences, and Laboratory for Green Porous Materials). Kyoto University will provide financial support for these On-site Laboratories continuously through adoption processes in Kyoto University.

## **8. Resource Allocation Plan**

\* Describe your plans over a 5-year period for allocating resources acquired from the host institution (e.g., financial resources and positions) and from external research funding to use in carrying out the Center's functions and activities described above.

\* In Appendix 4, enter concrete numbers in the Resource Allocation Plan.

### **8-1. Funding Support by Host Institution**

Until FY2024, Kyoto University plans continuous support of more than 1.6 billion yen annually for iCeMS. iCeMS is drawing a blueprint for self-reliance by increasing large-scale external funds acquired by iCeMS active researchers, as the support from the university will be declining gradually.

### **8-2. Personnel Support by Host Institution**

Kyoto University plans to maintain the current status of personnel support for five years from FY2020.

## WPI Academy Center

## Form 2 FY 2023 List of Principal Investigators

NOTE:

\*Underline names of principal investigators who belong to an overseas research institution.

\*Indicate newly added researchers in FY 2020 (2020.4.1-2021.3.31) in the "Notes" column.

\*Enter the host institution name and the center name in the footer.

		<Principal Investigators at the beginning of FY 2023>				Principal Investigators Total: 24	
Name	Age	Affiliation (Position title, department, organization)	Academic degree, Specialty	Effort (%)*	Starting date of participation	Status of participation (Describe in concrete terms)	Note
Uesugi Motonari	56	Professor, Institute for Chemical Research, Kyoto University	Ph.D. Chemical Biology	50	Oct. 1, 2007	Director Stays at the center more than 2 working days a week	
Kitagawa Susumu	71	Distinguished Professor, Institute for Integrated Cell-Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Coordination Chemistry	60	Oct. 1, 2007	Usually stays at the center	
Kengaku Mineko	56	Professor, Institute for Integrated Cell- Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Developmental Neurobiology	60	Oct. 1, 2008	Deputy Director Usually stays at the center	
Sivaniah Easan	51	Professor, Institute for Integrated Cell- Material Sciences, Institute for Advanced Study, Kyoto University	Ph. D. Physics	60	July 1, 2013	Usually stays at the center	
Suzuki Jun	45	Professor, Institute for Integrated Cell- Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Medical Biochemistry, Cell Membrane Biology	60	January 1, 2017	Deputy Director Usually stays at the center	
Fukazawa Aiko	43	Professor, Institute for Integrated Cell- Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Organic Chemistry	60	November 1, 2018	Deputy Director Usually stays at the center	
Furukawa Shuhei	45	Professor, Institute for Integrated Cell- Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Chemistry of Molecular Assemblies	60	October 1, 2010	Usually stays at the center	
Yuichi Taniguchi	44	Professor, Institute for Integrated Cell- Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Biophysics, System Biology	60	October 1, 2020	Usually stays at the center	
Tamanoi Fuyuhiko	75	Program-Specific Professor, Institute for Integrated Cell-Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Nanoparticles and Cancer Therapy	36	April 1, 2017	Cross-appointed with UCLA	
Ueda Kazumitsu	69	Program-Specific Professor, Institute for Integrated Cell-Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Cellular Bio- chemistry	60	Oct. 1, 2007	Research Administrative Director Usually stays at the center	
Nakanishi Kazuki	62	Program-Specific Professor, Institute for Integrated Cell-Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Sol-Gel Science, Porous Materials	12	August. 1, 2019	Cross-appointed with Nagoya University	
Horike Satoshi	45	Associate Professor, Institute for Integrated Cell-Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Materials Chemistry	60	January 1, 2017	Usually stays at the center	
Fujita Daishi	39	Associate Professor, Institute for Integrated Cell-Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Supramolecular Chemistry, Chemical Biology	60	April 1, 2018	Usually stays at the center	
Packwood Daniel Miles	37	Junior Associate Professor, Institute for Integrated Cell-Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Applied Mathematics and Theoretical Chemistry	60	April 1, 2016	Usually stays at the center	
Namasivayam Ganesh Pandian	43	Junior Associate Professor, Institute for Integrated Cell-Material Sciences, Institute for Advanced Study, Kyoto University	Ph.D. Bio-inspired therapeutics, Epigenetics	60	October 1, 2010	Usually stays at the center	

Name	Age	Affiliation (Position title, department, organization)	Academic degree, Specialty	Effort (%)*	Starting date of participation	Status of participation (Describe in concrete terms)	Note
Imahori Hiroshi	61	Professor, Graduate School of Engineering, Kyoto University	Ph.D. Organic Chemistry	10	Oct. 1, 2007	Adjunct PI	
Tanaka Motomu	52	Professor, Center for Integrative Medicine and Physics, Institute for Advanced Study, Kyoto University	Ph.D. Medical Physics, Soft Matter Physics	10	Apr. 1, 2018	Adjunct PI	
Tanaka Koichiro	60	Professor, Graduate School of Science, Kyoto University	Ph.D. Terahertz Optical Science	10	Apr. 1, 2008	Adjunct PI	
Mori Yasuo	63	Professor, Graduate School of Engineering, Kyoto University	M.D. Ph.D. Molecular Biology	10	Apr. 1, 2017	Adjunct PI	
Abe Ryu	49	Professor, Graduate School of Engineering, Kyoto University	Ph.D. Artificial photosynthesis, Solar hydrogen production, Photocatalysts	10	Apr. 1, 2017	Adjunct PI	
Kitagawa Hiroshi	61	Professor, Graduate School of Science, Kyoto University	Ph.D. Solid-state Chemistry: Electron-proton Coupled System	10	May 1, 2017	Adjunct PI	
Hamachi Itaru	62	Professor, Graduate School of Engineering, Kyoto University	Ph.D. Chemical Biology, Supramolecular Biomaterials	10	May 1, 2017	Adjunct PI	
Kageyama Hiroshi	53	Professor, Graduate School of Engineering, Kyoto University	Ph.D. Solid-state Chemistry	10	May 1, 2017	Adjunct PI	
Matsuda Michiyuki	64	Professor, Graduate School of Biostudies, Kyoto University	Ph.D. Bio-imaging, Visualization of inter- and intra- cellular signal transduction	10	May 1, 2017	Adjunct PI	

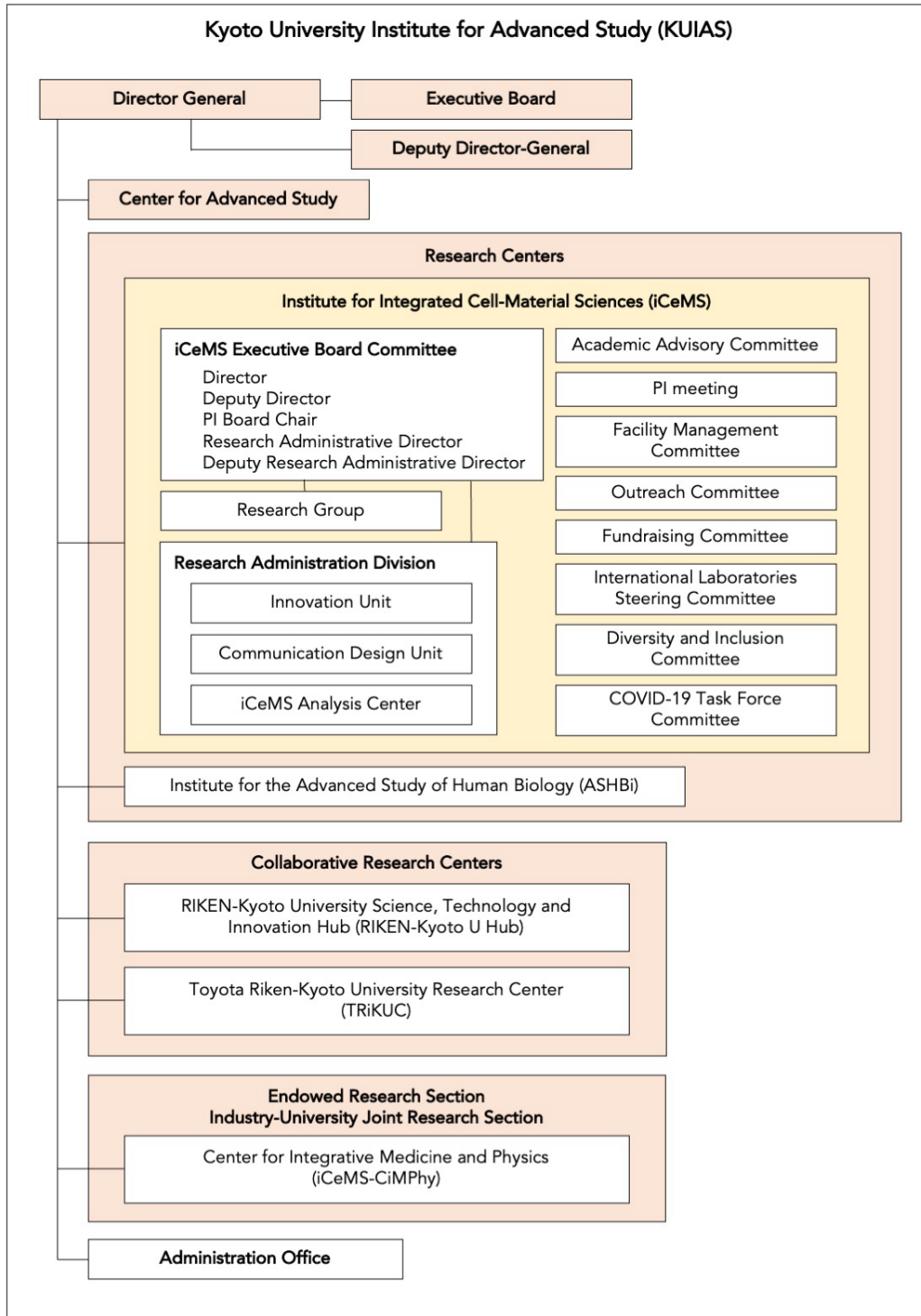
\*Percentage of time that the principal investigator devotes to his/her work for the Academy center vis-à-vis his/her total working hours.

#### Principal Investigators resigned since FY 2020

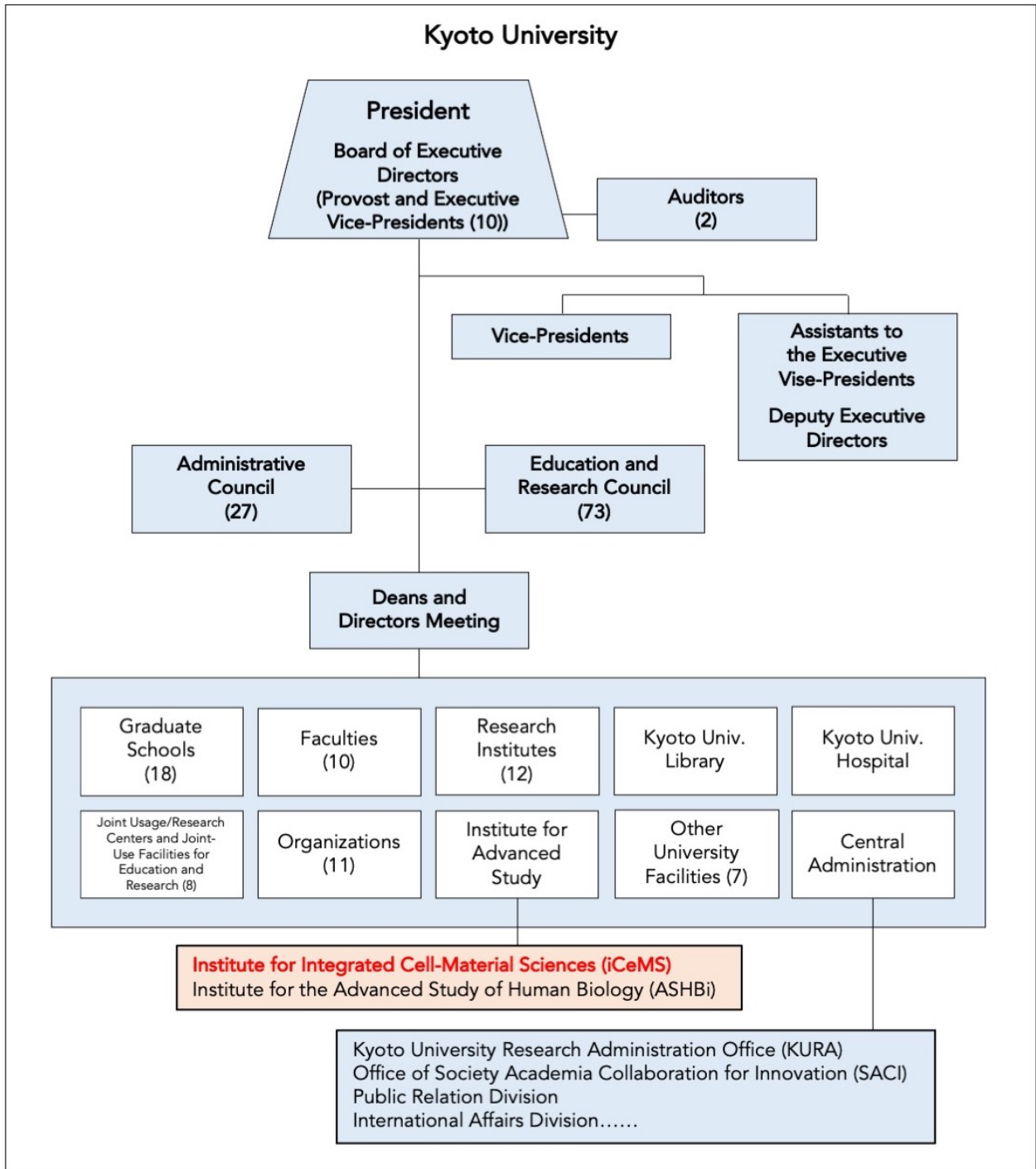
Name	Next Affiliation (Position title, department, organization)	Period of participation
Sugimura Kaoru	Associate Professor, Graduate School of Science, University of Tokyo	Apr. 1, 2011-Dec. 31, 2020
Hasegawa Koichi	Staff, StemRIM Inc.	Apr. 17, 2011-July 31, 2020
Wang Dan Ohtan	Team Leader, Laboratory for Neuroepitranscriptomics, RIKEN Center for Biosystems Dynamics Research	May 1, 2011-Mar. 31, 2021
Kageyama Ryoichiro	Team Leader, Neural Stem Cell Research, RIKEN Center for Brain Science	Feb. 2, 2013-Mar. 31, 2021
Sugimoto Kunihisa	Professor, Graduate School of Science and Engineering, Kindai University	Jan 10, 2019-Mar. 31, 2022
Sugiyama Hiroshi	Specially Appointed Professor, Institute for Integrated Cell-Material Sciences, Institute for Advanced Study, Kyoto University	Apr. 1, 2008-Mar. 31, 2022
Kamei Kenichiro	Associate Professor, Programs of Biology and Bioengineering, Divisions of Science and Engineering, New York University Abu Dhabi	May 24, 2010-Jan. 31, 2023
Carlton Peter	Associate Professor, Graduate School of Biostudies, Kyoto University	Mar. 1, 2010-Mar. 31, 2023

## Appendix 3 Diagram of Organizational Management System

- Diagram **separately** the Center’s organizational management system **and** its position within the host institution in an easily understood manner. If you are planning to change your organization management system and/or its position within the host institution in or after FY 2020 compared to their description in Appendix 3-1 of Activities report, show the changes in the diagram.







As of July 2022

## **New Vision**

WPI-iCeMS Center Director Prof. UESUGI Motonari

### **[Research]**

**Chemistry and biology are flagship areas of research at Kyoto University (KU). WPI-iCeMS takes the lead in harmonizing these two fields, driven by faculty and students across the university. Through the organic fusion of these fields, we are endeavoring to gain an understanding (theory) of the intracellular self-assemblies at the boundary of life and matter, while seeking to inspire innovations (application) driven by functional self-assembled materials. Our aim is to more explicitly clarify and realize WPI-iCeMS's previous research goals.**

- Life is essentially made up of chemical substances; however, chemical substances are not life. The question is at what stage do chemical substances manifest “lifelikeness.”
- WPI-iCeMS regards the “self-assembly of chemical substances” to lie at the core of the division between chemicals and life.
- Intracellular self-assemblies are what maintain life. They include membrane structures, non-membrane organelles (liquid-liquid separation bodies), cell skeletons and chromatin.
- WPI-iCeMS seeks to understand intracellular self-assemblies and to utilize this knowledge to tackle global issues through the creation of innovative self-assembled materials.
- Introduction of the concept of self-assembly has necessitated a significant shift in perspective regarding both chemical and biological reactions. Computational sciences such as machine learning can accelerate the pace of this research.
- Toward achieving these goals, WPI-iCeMS brings together a team of researchers from both in and outside the university, Japan and abroad, who are young and old, male and female, and whose work is related to cell biology, materials science, chemical biology, synthetic chemistry, and computational science. We aspire to achieve both diversity and focus.

### **Specific Research Projects**

#### **1. Understanding intracellular self-assemblies at the boundary of life and matter**

Life is the ultimate example of self-assembly. WPI-iCeMS is working to gain a molecular-level understanding of intracellular self-assemblies that control compartmentalization, information transfer, gene expression, and energy metabolism, and to lead the way in developing chemical tools that will enable this understanding.

#### **2. Creating functional self-assembled materials inspired by intracellular self-assemblies**

Chemists can gain inspiration from self-assemblies within cells. Impelled by such inspiration, WPI-iCeMS is working to create novel functional materials and to use them in meeting the challenge of finding solutions to global issues. Examples of these materials include self-assembling pharmaceuticals, self-assembling materials for purifying substances, self-assembling materials for energy-storing, and materials that self-assemble to initiate chemical transformation of carbon dioxide.

## [System Reform and Globalization]

**WPI-iCeMS is a test bed for Kyoto University, as such it leads the way in conducting proof-of-concept experiments for university-wide planned reforms and next-generation research laboratories, the results of which are shared throughout the organization. Special emphasis is placed on the following points.**

- **Strategic Recruitment of Talented International Students and Young Researchers**

The number of international students enrolled in Kyoto University's graduate schools has increased. However, their quality is not sufficient when compared to international students in Europe and the United States. Through strategic recruitment initiatives, an effort is being made to secure top-tier international students and talented young researchers. In this effort, we are working with KU's Division of Graduate Studies.

- **Active Participation of Undergraduate Students in Research Activities**

To raise the level of research at Kyoto University, it is important to foster a research mindset among undergraduate students before they matriculate to graduate school. Working together with iUP, measures are taken to receive not only Japanese but also international undergraduate students in the research laboratories.

- **Global Development through On-site Labs**

WPI-iCeMS operates Kyoto University's On-Site Labs in six locations around the world. These on-site labs serve as a test bed for the globalization of Kyoto University. In addition to joint research and equipment sharing, these labs serve as experimental hubs for student recruitment, graduate school admissions testing, and local fundraising. In operating these labs, WPI-iCeMS collaborates with two university-wide divisions: the International Strategy Office (iSO-KU) and the Division of Graduate Studies.

- **Operation of Core Facilities**

Core facilities, which efficiently share, maintain and manage cutting-edge research equipment, are operated in a manner similar to those in Europe and the United States.

- **Innovation through the Establishment of Start-ups**

For the future development of WPI-iCeMS, it is necessary to give back to society through start-ups. The Innovation Unit of the Research Administration Division (RAD) of iCeMS tests experimental methods in cooperation with KU's Office of Society Academia Collaboration for Innovation (SACI).

- **Efficient Fundraising**

With a clear focus on objectives, iCeMS RAD explores efficient ways of fundraising through targeted publicity campaigns and analysis of donors' decisions and purposes.

- **Optimization of Internal Communication**

It is known that organizations that optimize internal communication have higher levels of efficiency, compliance and satisfaction, and lower levels of risks and turnovers. New initiatives are being taken, such as leveraging mobile technology, to optimize internal communication within WPI-iCeMS.

- **Interdisciplinary Collaborative Research**

The kind of internal communication that spawns interdisciplinary collaborative research involves identifying and studying successful patterns of interdisciplinary joint research and then verifying their results through experimentation.

— **Promotion of Diversity, Equity & Inclusion (DE&I)**

At WPI-iCeMS, the percentages of female and foreign faculty members are about 20% each, which is higher than the percentage of female faculty members in KU's natural science departments (9.5%), and closer to the level in Western countries. To address the disparity in these numbers as well as illuminate issues such as unconscious bias, WPI-iCeMS leads the university in raising DE&I to higher Western levels.