Application for Academy Center Certification
World Premier International Research Center Initiative (WPI)

Host Institution	Kyushu University
Research Center	International Institute for Carbon-Neutral Energy Research (I^2CNER)
Host Institution Head	Chiharu Kubo
Center Director	Petros Sofronis
Administrative Director	Shunichi Masuda

Please prepare this application based on the content of your Center's progress report and the progress plan you submitted for the Center's final evaluation. 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.

I^2CNER's vision is to contribute to the creation of a carbon-neutral society through basic research underlying technology that will address the energy challenge for Japan and the world, and establish a model international academic environment for the 21st century. In executing this vision, I^2CNER aims to enable energy technologies which, when deployed, lead to a large reduction of greenhouse gas emissions (70-80% by 2050 from 1990 levels). I^2CNER's mission and accomplishments are directly in line with Japan's vision for a robust energy future: energy security, economic efficiency, and environmental protection without compromising safety (3E+S). A unique and important component of I^2CNER is the Satellite Institute at the University of Illinois at Urbana Champaign (UIUC), which facilitates complementary research activities and pioneers student and researcher exchanges with the US.

We built our vision on a **balanced energy scenario** for Japan involving a combination of renewable energy deployment and carbon capture and storage technologies, with the addition of hydrogen into the energy system. I^2CNER's research efforts are intimately tied to this scenario because the short-, mid-, and long-term milestones of each of our **research project roadmaps** were established in consideration for the removal of the roadblocks in the development and deployment timing of the various promising technology options within the scenario. By necessity the research teams are composed of scientists and engineers from disparate disciplines and the research addresses phenomena that span many decades in spatial and temporal scales. I^2CNER's roadmaps and research portfolio updates are also informed by the Institute's scientific exchanges with a stellar list of distinguished scientists from 25 partnering institutions across the globe.

The relevance of the I^2CNER research efforts and objectives to enabling the green innovation initiative of the government of Japan is demonstrated by the large number (122) of collaborative projects in which its researchers have been involved with industry. A total of 53 projects resulted in technology transfer events. Since inception, I^2CNER has filed for 239 patents and was granted 67 patents.

Evidence of I^2CNER's international stature and relevance can be seen in its 2816 publications since inception with a total number of 47147 citations and an h-index of 88 which is on par or better than the h-index of peer institutes. Our researchers have joint publications with researchers from 573 institutions around the world, and 343 internationally recognized researchers visited I^2CNER for scientific interaction and exchange. The Institute's researchers are globally engaged and have been responsible for organizing, co-organizing, or serving on the scientific committees of 207 international conferences, 278 international conference sessions/symposia or workshops, and 68 I^2CNER international workshops. In addition, I^2CNER researchers have received a total of 310 national and international awards from various professional societies and institutions around the world.

I²CNER provides a rich environment for young researchers to pursue transformative research in a non-traditional and highly multi-disciplinary and international setting. A vital interdisciplinary program is the fusion of applied math with energy engineering, based on the Institute's burgeoning relationship with Kyushu University's (KU) Institute of Mathematics for Industry (IMI) and various departments at the UIUC. Of the 91 young researchers, 21 went on to take faculty positions at universities in Japan (excluding KU) and the world and 7 moved to industry and national laboratory positions.

I²CNER is spearheading KU's globalization efforts within the University Reform Revitalization Program, and I²CNER faculty are instructors in the international programs of KU. I²CNER's operational principles in research served as an example for the establishment of the Kyushu University Platform of Inter/Transdisciplinary Energy Research (Q-PIT) on October 1, 2016, an umbrella organization to integrate campus efforts in research and education on energy across its various units, including social sciences, economics, law, and political sciences.

In summary, I²CNER is a highly successful research and education test bed. It is a national and global experiment that *tackles key scientific challenges along the path to providing Japan with carbon-neutral and sustainable energy supplies and the advancing of low-carbon energy transition despite limited energy resources* through internationalization of scientific research and education in Japan, the US, and the world at large. I²CNER is unique as the only Japan-led multi-university institute in the world constructing the path to a carbon neutral society.

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

* Describe new challenges in the Center's research objectives and plans after FY2020.

While I²CNER's accomplishments have propelled Japan to the international forefront of carbon-neutral energy research and associated technology development, there are still major challenges ahead. Our focus continues to address basic science and engineering for energy with the overall goal of reduced CO_2 emissions. In response to the Final Evaluation's Site Visit Report's advice/recommendation, our Energy Analysis Division (EAD) assessed the Technology Readiness Level (TRL) of each individual research project. We are using this assessment to make best use of resources and better focus our research directions in order to meet the long-term carbon-neutrality goals. As a result, I²CNER will streamline its research portfolio by reshaping its strongest research themes and phasing out those that are less impactful according to TRL. In addition, I²CNER will continue to invest in disruptive, high-risk high-payoff science as well as directed, discovery research, such as the biomimetic activation of small molecules for the reduction of CO_2 and N_2 to produce hydrocarbons and NH_3.

Moving forward, the three streamlined thematic research clusters or '**Thrusts'** will be **Advanced Energy Materials**, **Advanced Energy Conversion Systems**, and **Multiscale Science and Engineering for Energy and the Environment**. This structure allows us to capture our most relevant existing capabilities and to organize them for the best future impact. It also provides an efficient mechanism for top international and Japanese researchers to work interactively to accomplish common goals which cut across disciplines. I²CNER will continue to rely on the central role of the current EAD that will be integrated in the Multiscale Science and Engineering for Energy and the Environment Thrust. This includes the continued use of Roadmaps to set research goals and assess progress for each individual research project within the thrusts. *I²CNER sees that this Research-Project Roadmap approach, which has proven highly successful in the past, should direct the science and resource planning for the future*.

The **Advanced Energy Materials** Thrust combines the best features of the development of materials for hydrogen generation, transport and storage, and materials for efficient energy conversion, particularly for fuel cell and regenerative energy applications. More specifically I²CNER will carry out research on i) low cost high-strength, hydrogen-compatible stainless steels having yield strength 600MPa (current research status of TRL~4) by developing the next generation of hydrogen/fatigue and hydrogen/impurity interaction models, ii) highly selective catalysts for CO_2-free power generation via alcohol (energy storage medium) oxidation and acid reduction (fuel regeneration) for the I²CNER polymer electrolyte alcohol electrosynthesis cell aiming at 70% efficiency (TRL~4), iii) interface design of molecular and hybrid catalysts for water splitting and artificial photo-synthesis for photoconversion devices that can provide low cost solar fuels with reasonable cost and efficiency (TRL~3); and iv) biomimetic activation of small molecules (TRL~3).

The **Advanced Energy Conversion Systems** Thrust focuses on the development and evolution of systems which either lower carbon emission, increase energy efficiency, or both: i) the thermo-neutral electrolysis cell has the potential to take a large share in the electrolyzer market due to its high efficiency and low cost. I²CNER's research will focus on the electrode structure in relation to water-assisted phase

separation, the quantitative prediction of oxygen reduction, and the degradation mechanisms for technological functional oxides (TRL~4), ii) the energy storage system utilizing reversible fuel cell / novel battery is a promising means to modulate/adjust supply and demand in electricity markets. We have developed an air-battery based on SOFC/SOEC concepts where H_2 is used to reduce hematite to metallic Fe thereby storing reducing equivalents as metallic Fe rather than H_2. Future research will optimize this device for higher roundtrip efficiency, capacity, and operating temperature (TRL~4), iii) I^{2}CNER will advance the exciting photovoltaics technology of hybrid perovskite solar cells whose adoption in the PV markets can lead to drastic CO_2 reductions. I^{2}CNER research will focus on increasing the efficiency of the lead-free systems we developed and found to exhibit promising durability (TRL~4).

The **Multiscale Science and Engineering for Energy and the Environment** Thrust pulls together the range of challenges facing Japan's and the world's energy transition, namely the transition from largely fossil fueled energy technology to a carbon-neutral or a carbon-free energy supply. In addition, this Thrust enables the coordination of carbon reduction technologies, energy efficiency technologies, and guidance for social, political, and investment strategies to coordinate this transition. Negative emission technologies, contributed to by our CO_2 separation and monitoring technologies, are expected to be supported by the public. I^{2}CNER's research will focus on i) PVT measurements and accurate equations of state for new refrigerants for next generation adsorption heat-pumps that will penetrate our society as the energy demand due to air conditioning increases (TRL~4). Our research on activated carbons has already shown great promise for record adsorption capacity of ethanol and CO_2 (TRL~4), ii) further development of nanosized CO_2 separation membranes (TRL ~4) and CO_2 monitoring technologies (TRL~7)—through improved understanding of the geophysics of CO_2 storage (TRL~1) and reservoir characterization (TRL~5)—will enable effective Carbon Capture and Storage (CCS) deployment. I^{2}CNER will continue to explore the efficient and selective conversion of captured CO_2 into value added products (TRL~4). In addition, capitalizing on talent and resources across KU, we will invite new members (WPI Professors) to diversify I^{2}CNER's expertise and research portfolio of the Thrust to include the integration of renewable energy with the grid, the interaction of the energy networks with the environment, and social and economic dynamics. These members have already interacted with I^{2}CNER through our current **Applied Math and Economics Initiative.** New WPI Professor Murata of the Dept. of Electrical Engineering will apply optimization theory to model residential energy consumption, accounting for customer behavior. New WPI Professor Managi of the Dept. of Urban and Environmental Engineering will investigate "welfare" models of energy, work, leisure, health, and finances to rank social and economic systems. From the Institute of Mathematics for Industry, new WPI Professor Shirai will use Persistent Homology to understand porous materials for CO_2 storage and new WPI Professor Hirose will use machine learning to analyze data and discover customer behaviors that affect the power grid.

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 plan.
* 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.

To make best use of financial resources beyond 2020, I^{2}CNER's research operations, international engagement, brain circulation, technology transfer, and socioeconomic outreach will be executed and advanced through the "*Three Thrust, Two Platform*" approach. The three research Thrusts, outlined in Section 2, will be interwoven with the **Platform for International Collaborations and Partnerships** for I^{2}CNER to maintain its international identity and the **Platform for Societal Implementation and Industrial Collaboration** that will ensure technology transfer through the large and growing network of I^{2}CNER's industrial interactions. I^{2}CNER will continue to operate under the strong leadership of Director Sofronis who will report to Executive Vice President (EVP) in charge of Research and Finance, Prof. Kazuhide Inoue. Administrative Director Masuda with his extensive experience working in industry, both in the U.S. and Japan, will continue the oversight of the Administrative Office.

I^{2}CNER's research program beyond 2020 will be anchored on 24 PIs (23 presently in I^{2}CNER) and operate under the umbrella of three research thrusts with the following composition: i) Advanced Energy Materials: Tenured I^{2}CNER PIs Yamauchi, Kubota, Staykov, Sofronis; tenured I^{2}CNER Associate Professors Yoon, Takahashi, and M. Watanabe; and KU PIs Ogo and Sugimura. The research activities of the thrust will be supported by the international PIs Kirchheim and Somerday of the platform for international collaborations and partnerships, ii) Advanced Energy Conversion Systems: Tenured I^{2}CNER PI Matsumoto; and KU PIs Adachi, Ishihara, Takata, Fujigaya, and Sasaki. The research activities of the thrust will be supported by the international PIs Tuller, Kilner, Lippert, and Gewirth of the platform for international collaborations and partnerships, iii) Multiscale Science and Engineering for Energy and the

Environment: Tenured I²CNER PIs Saha and Fujikawa; tenured I²CNER Associate Professor Chapman, KU PIs Tsuji and H. Watanabe; I²CNER WPI Professor Itaoka; international PI Zhang, and international PI Stubbins to be appointed effective April 1, 2020.

I²CNER's **Platform for Societal Implementation and Industrial Collaboration** will be tasked to accelerate impactful technology development and transfer to industry, and foster the advancement of interactions with national and international agencies. This platform will focus on the goals currently pursued by the Industrial Research Division, augmented with a societal dimension to advance the engagement of I²CNER with industry and society at a broader institutional level. Resources will be sought to staff the platform with an expert that can bring the I²CNER research accomplishments to the attention of national and international corporations and help I²CNER execute its mission as a resource to national agencies such as METI on the current state-of-the-art in energy research. With regard to the social implementation, I²CNER's research will seek to deal with critical policy issues in Japan such as the aging, shrinking population with regard to low-carbon energy transition and will consider the impact of behavior, specifically the environmental and social equity impacts of household consumption and participation in the energy system. The **Industrial Advisory Board** will continue on with its role in advising on research relevance and counseling on technology transfer. Lastly, this platform will be working with the PIs and faculty of the three thrusts to pursue joint research funding among national agencies of the government of Japan, e.g. JSPS, and counterpart international agencies, e.g. US NSF.

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.

I²CNER will maintain its international identity through the **Platform for International Collaborations and Partnerships.** This platform will involve Illinois, MIT, Paul Scherrer Institut (PSI) at ETH, Imperial College, London, University of Edinburgh, Göttingen, and other institutions from the list of our 25 partnering institutions, e.g. the Helmholtz Institute Forschungszentrum Juelich. Through this platform, I²CNER will continue its successful program on graduate student and postdoc exchanges, and faculty sabbaticals. In addition, all 8 of our overseas Principal Investigators are world-class researchers who are actively involved in I²CNER's research operations. They spend between one to seven weeks at KU and their ongoing relationships with the faculty of KU are having a transformative impact upon I²CNER's overall research culture.

The Kyushu-Illinois memorandum of understanding (MOU) was renewed and went into effect on August 26, 2019 and a specific agreement for student exchange was signed on September 30, 2019. The revised MOU has cemented the strategic partnership between the two universities and broadened the collaborations to other colleges and departments (such as engineering, social sciences, humanities, economics, law, agriculture etc.). The Satellite Institute at the UIUC will continue to facilitate cooperative research activities and personnel exchanges as follows: i) Kyushu faculty, postdoc, and student visits to Illinois will be facilitated by departmental and university personnel that will assist with visas, visitor accommodations, and sabbaticals, ii) shared facilities and laboratory and office space will remain available, iii) Satellite office will be maintained and the director's time will be arranged, iv) tuition waivers will be explored for up to 4 PhD students from Kyushu if they come to Illinois to take courses, and engage in collaborative research.

Our international collaborations will be advanced by young researcher exchanges, travel, and sabbaticals. These operations will be supported by the Gaisan Yokyu in the short term and by funds our researchers will secure. Successful examples are the upcoming sabbatical or Prof. Chapman at UIUC through the Progress 100 Program, the collaboration of PI Takata with the University of Edinburgh through Progress 100 and ThermaSMART (European Union Horizon 2020 project), the collaborations of PI Ishihara with PSI and PI Matsumoto with European centers and universities through SICORP, JST Programs respectively with the Swiss Federal Science Foundation and the European Interest Group for Japan. Also, I²CNER researchers will leverage the established infrastructure, research culture, and international partnerships of the Institute to continue already established joint international programs such as the Partnerships in International Research and Education (PIRE) with UIUC and the Core-to-Core Program with the Imperial College, London, PSI, and MIT. Lastly, I²CNER will continue to work with the University of Göttingen to establish an International Research Training Group that can be co-funded by the German Research Foundation (DFG) and JSPS.

I²CNER's annual international symposium and international thematic research workshops over the past decade have proven to be successful platforms for international engagement and exploration of new scientific directions as they have attracted hundreds of distinguished researchers from across the

globe. I^{2}CNER will continue organizing this symposium and workshops within the Annual KU "Energy Week" event supported by the KU's Platform Q-PIT. In addition, I^{2}CNER will continue to organize with other WPI Centers the WPI-Symposium at the E-MRS meetings and the biennial Japan-France Workshop on Nanomaterials, NanoMat. Lastly, the successful I^{2}CNER Seminar Series to engage key members of the international community from academia, national laboratories, industry, and government agencies (policy makers) will be continued.

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 institutes and advancing system reforms.

Drawing from its international research experiences and approaches, I^{2}CNER will continue its central role within Q-PIT by helping to cross-pollinate a wide range of collaborations on energy research between KU research units of diverse disciplines including social sciences, economics, law, and political sciences. This will allow I^{2}CNER to capitalize on opportunities to broaden and enrich its energy portfolio while also helping Q-PIT advance its mission to catalyze interactions between disparate disciplines and units.

I^{2}CNER will continue its efforts to support the KU Administration's i) institutionalized cross-appointment employment system as in the case of Prof. Y. Baryshnikov of UIUC that was employed by IMI during the summer of 2019 and is to be employed in the summer of 2020, and ii) Intra-University Faculty Transfer System. By way of example, in FY2020, three additional senior KU PIs from other KU units will be transferred to I^{2}CNER. To advance the career of promising young researchers, I^{2}CNER will work with the Inamori Frontier Research Center at KU.

I^{2}CNER in collaboration with the College of Engineering will continue the successful undergraduate exchange program that involves an one-month visit to Illinois by KU undergraduates for research under the supervision of Satellite faculty and interactions with Illinois' Center for East Asian and Pacific Studies (CEAPS) to enhance their cultural experience of the University. In association with this student exchange, I^{2}CNER will continue hosting summer visits of American undergraduates at KU laboratories and the tradition of organizing the annual student-exchange workshop in Fukuoka under the sponsorship of the US Consulate.

A significant mission of the **Platform for Societal Implementation and Industrial Collaboration** will be the engagement of the member corporations of the Japan-US Business Council (JUBC) with I^{2}CNER in the form of partnership and industrial investment through the model of open innovation whereby industry engineers are imbedded in I^{2}CNER laboratories. Such activities of the Platform will be a most demonstrable example of feeding the I^{2}CNER accomplishments back into the society.

6. Plan for Sustaining the WPI Brand

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

I^{2}CNER will sustain the WPI Brand by focusing on advancing outstanding research that sets international benchmarks, which brings international recognition, and by expanding global visibility.

In the area of scientific excellence, I^{2}CNER's research themes outlined in the three Thrusts are the ones in which I^{2}CNER already set the international benchmarks and will continue to do so in the future. In collaboration with the IMI, I^{2}CNER will continue involving 21st century mathematics (e.g. persistent homology) in engineering research, which is an unprecedented fusion of disciplines initiative. As of March 31, 2019, the Institute's researchers were responsible for organizing, co-organizing, or serving on the scientific committees for 207 international conferences, 278 international conference sessions/symposia or workshops, and 68 I^{2}CNER international workshops. Our researchers have given 565 keynote, plenary and invited presentations in international conferences and fora. Indeed, this is solid evidence that I^{2}CNER will strive to expand on this record of recognized international engagement and global visibility. I^{2}CNER placed 45 of our researchers at various Japanese (excluding KU) and international institutions. I^{2}CNER will continue fostering its WPI culture for young researchers by maintaining and improving its WPI research environment that it has built over the past 10 years.

7. Support by Host Institution

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

I^{2}CNER is a permanent research Institute of KU and at the center of the KU mid-term plan to "promote leading-edge research related to the carbon-neutral energy research domain in collaboration with the University of Illinois, which is conducted at the International Institute for Carbon-Neutral Energy Research (I^{2}CNER)." During the past 10 years, I^{2}CNER has been successful at winning and

filling positions, and KU will make efforts to secure additional positions for the Institute. By the end of FY18, I^{2}CNER filled a total of 6 Associate and 4 Full Professor positions, and 2 tenure-track assistant professors on applied math for energy jointly with IMI. I^{2}CNER is currently in the process of hiring another tenured Associate Professor in FY2019. Lastly KU envisions for I^{2}CNER to become a primary research entity within Q-PIT.

The university will grant I^{2}CNER Building I for the time being and Building II constructed with WPI funds for 10 years (total floor space of 4,236 m^2 and 5,014 m^2, respectively) free of charge to provide the I^{2}CNER researchers with the requisite environment to continue their cutting-edge research. The space provided by this support significantly exceeds the space allotment per researcher under the university's regular policy

KU will support the salaries of the required staff members, thus securing the successful operation of the "*Three Thrust, Two Platform*" new I^{2}CNER organization

8. Resource Allocation Plan

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

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

Financial resources and positions to be acquired from the host institution and their allocation have been listed in the preceding Section 7. Regarding external resources, our vision is that I^{2}CNER can remain strong and agile by developing cores of embedded centers funded by external agencies (both industrial and governmental) and securing industrial projects. Drawing from the experience gained from the establishment of the NEXT-RP Center, I^{2}CNER will intensify its efforts to establish similar internal research centers in response to national initiatives by government agencies such as NEDO, METI, Riken, JSPS, and JST. Riken, for example, currently does not have a location in the Western part of Japan, making KU a strong option for a potential future center. With regard to establishing internal research centers, I^{2}CNER will i) rely on input from the External Advisory Board to create new ideas that will attract funding from international foundations (e.g. Gates Foundation, Simons Foundation), ii) utilize the Platform for Societal Implementation and Industrial Collaboration to attract industrial projects for collaborative efforts in the form of open innovation on topics of mutual interest, such as the ongoing project for Mobile Energy Storage for Low-Carbon Society. Successful examples of activities that attracted industrial funding are the workshops that were organized individually for co-electrolysis of CO_2 and H_2O, thermal management for fuel cells, and electrochemical energy conversion and hydrogen materials compatibility. Our ability to obtain industrial funding to support our research operations is demonstrated by the 122 collaborative projects we have had with major corporations (see Section 1) and the 53 projects that resulted in technology transfer events.

I^{2}CNER will intensify the ongoing dialogue with the Japan-US Business Council (JUBC) for potential investment in I^{2}CNER. As a result of the meeting with the JUBC in Tokyo on Dec. 9, 2019, we are in communication with a general trading and investing company. In general, it is our plan that all our projects in the three Thrusts will seek industrial support.

Lastly, I^{2}CNER researchers will leverage the established international visibility of the Institute to aggressively expand our existing research infrastructure as described in our JSPS Progress Report submitted for the Center's final evaluation, under "Ongoing Funded Research Programs," page 14.

World Premier International Research Center Initiative (WPI)
List of Principal Investigators

- If the number of principal investigators exceeds 10, add columns as appropriate.
- Give age as of 1 April 2020
- For investigators who will not participate in the Center project at the time of this application, indicate the time that their participation will start in the "Notes" column.

Name	Age	Affiliation (Position title, department, organization)	Academic degrees and specialties	(Notes) Enter "new" or "ongoing"
1. Center Director Petros Sofronis	62	Prof., I^{2}CNER, Kyushu University	Ph.D., Micromechanics of materials, Environmental degradation of materials	Ongoing
2. Tatsumi Ishihara	58	Prof., I^{2}CNER, Kyushu University	Dr. of Engineering, Catalyst and solid state electrochemistry	Ongoing
3. Chihaya Adachi	56	Prof., Department of Applied Chemistry, Kyushu University	Dr. of Engineering, Materials science, device physics	Ongoing
4. Seiji Ogo	56	Prof., I^{2}CNER, Kyushu University	Dr. of Science, Green Chemistry	Ongoing
5. Kazunari Sasaki	55	Prof., I^{2}CNER, Kyushu University	Dr. of Science and Technology, Fuel cell materials, Inorganic materials	Ongoing
6. Harry L. Tuller	74	Prof., Department of Materials Science and Engineering, Massachusetts Institute of Technology, USA	Dr. of Engineering Science, Functional electroceramic materials	Ongoing
7. John A. Kilner	73	Prof., Department of Materials, Imperial College, London, UK	Ph.D., Materials for solid oxide fuel cells and electrolysers	Ongoing
8. Joichi Sugimura	62	Prof., I^{2}CNER, Kyushu University	Dr. of Engineering, Tribology and Machine Design	Ongoing
9. Yasuyuki Takata	63	Prof., I^{2}CNER, Kyushu University	Dr. of Engineering, Thermal Engineering	Ongoing
10. Xing Zhang	58	Prof., Department of Engineering Mechanics, Tsinghua University, China	Ph.D., Thermal Science	Ongoing

11. Brian P. Somerday	51	Dr., South West Research Institute, USA	Ph.D., Materials Science and Engineering	Ongoing
12. Reiner Kirchheim	76	Prof., The Institut für Metallphysik, University of Göttingen, Germany	Ph.D., Hydrogen in Metals, Thermodynamics of alloys, Interstitial solution and diffusion in glasses	Ongoing
13. Miho Yamauchi	46	Prof., I^{2}CNER, Kyushu University	Dr. of Science, Solid-state physical chemistry, Solid-state NMR, Nano materials, Catalysis, Hydrogen storage	Ongoing
14. Andrew A. Gewirth	60	Prof., Department of Chemistry, University of Illinois at Urbana Champaign, USA	Ph.D., Chemistry	Ongoing
15. Shigenori Fujikawa	49	Associate Prof., I^{2}CNER, Kyushu University	Dr. of Engineering, Nanoscience and engineering	Ongoing
16. Takeshi Tsuji	40	Prof., I^{2}CNER, Kyushu University	Dr. of Science, Earth and Planetary Science, Resource engineering, Space exploration	Ongoing
17. Hiroshige Matsumoto	53	Prof., I^{2}CNER, Kyushu University	Dr. of Engineering, Solid electrochemistry and Solid state ionics	Ongoing
18. Bidyut B. Saha	54	Prof., I^{2}CNER, Kyushu University	Dr. of Engineering, Thermal Engineering, Heat Transfer, Refrigeration and Air-conditioning Engineering, Adsorption Desalination	Ongoing
19. Thomas Lippert	57	Prof., Department of Chemistry and Applied Biosciences, Laboratory of Inorganic Chemistry, Swiss Federal Institute of Technology Zurich, and Paul Scherrer	Dr. of Science, Physical Chemistry	Ongoing

		Institut, Thin Films & Interfaces Group, Villigen-PSI, Switzerland		
20. Tsuyohiko Fujigaya	43	Prof., Department of Applied Chemistry, Kyushu University	Ph.D. of Chemistry, Polymer Chemistry and Supramolecular Chemistry	Ongoing
21. Alexsandar T. Staykov	41	Associate Prof., I^{2}CNER, Kyushu University	Dr. of Science, Physical and Theoretical Chemistry	Ongoing
22. Hiroaki Watanabe	47	Associate Prof., Department of Mechanical Engineering, Kyushu University	Ph.D. Engineering	Ongoing
23. Masanobu Kubota	50	Prof., I^{2}CNER, Kyushu University	Dr. of Engineering, Strength of engineering materials, Metal fatigue, Fretting fatigue, Hydrogen structural materials	New (As of April 1, 2019)
24. James Stubbins	71	Prof., Department of Nuclear, Plasma, and Radiological Engineering, University of Illinois at Urbana-Champaign	Ph.D. Materials Science, Development and assessment of materials for energy systems	New (Proposed for FY 2020)

World Premier International Research Center Initiative (WPI)
Number of Center Personnel

	FY2020	
	Number of persons	%
Researchers	102	
Overseas researchers	34	33%
Female researchers	7	7%
Principal investigators (PIs)	24	
Overseas PIs	11	46%
Female PIs	1	4%
Other researchers	58	
Overseas researchers	13	22%
Female researchers	3	5%
Postdocs	20	
Overseas Postdocs	10	50%
Female Postdocs	3	15%
Research support staffs	46	
Administrative staffs	13	
TOTAL	161	

World Premier International Research Center Initiative (WPI)
Diagram of Organizational Management System

- Diagram the Center's organizational management system and its position within the host institution in an easily understood manner.