

Host Institution's Commitment

Date 21 February 2022

To MEXT

Name of host institution: Kanazawa University
Name and title of head of host institution: The President, Koetsu Yamazaki

I confirm that the measures listed below will be carried out faithfully regarding "(Nano Life Science Institute)" adopted under the World Premier International Research Center Initiative.

<Provision in host institution's mid-to-long-term plan>

• Describe clearly the host institution's mid-to-long-term plan and how it will position the center within that plan.

The host institution, Kanazawa University (hereafter, KU), states in its Third Medium-term objectives/Medium-term plans (FY2016-FY2021) that KU further promotes strong research such as nanotechnology using innovative atomic force microscopy technology, innovative material development using supramolecular technology and research on cancer metastasis and drug resistance mechanisms, in a systematic and intensive manner through the on-campus COE system. At the same time, KU states that the research implementation mechanism will be strengthened with the aim of becoming a research center at the highest international level for interdisciplinary, i.e., fused research.

Based on the Third Medium-term objectives/Medium-term plans, KU reorganized its existing institute, the Cancer Research Institute, and subsequently established the Nano Life Science Institute, NanoLSI, in FY2017, the Nanomaterials Research Institute in FY2018, the Advanced Manufacturing Technology Institute in FY2019 and the Advanced Mobility Research Institute in FY2021. Thus, a group of multi-disciplinary, fused research institutes has been established. In FY2020, KU contributed 650 million yen from its own funds and, together with the budget from MEXT, the new NanoLSI Research Building was completed. While KU aims to provide a research base at the highest international level in each of these five research institutes in their own multi-disciplinary, i.e., fused academic field, NanoLSI is particularly positioned as a pioneering, path-breaking institute. It is clearly stated in the Medium-term plans that "a system will be constructed and operated in which the autonomous operation of the Institute (NanoLSI) will be fully demonstrated."

In the Fourth Medium-term objectives/Medium-term plans (FY2022-FY2027), it is clearly stated that KU aims at "strategic expansion/strengthening of outstanding fields, promotion of interdisciplinary, i.e. fused research, expansion/strengthening of domestic and overseas networks, and promotion of the formation of a world-class academic center", for which KU "selects research fields that enhance international presence and establishes an educational and research environment (special research funds, salaries, etc.) that can acquire excellent researchers and students from Japan and overseas", and that "KU will promote the formation of the world-class academic centers by fostering and strengthening outstanding research fields and developing good practice throughout the university."

<Concrete Measures>

• Describe the concrete measures that the host institution will take to satisfy the following requirements.

- 1) How the host institution will support the center's operation and research activities in accordance with the FY 2017 Application Guidelines, section "6. Host institution's commitment."**

Taking over the results of the Third Medium-term objectives and plans, and aiming to reinforce KU as research base at the highest international level based on the Fourth Medium-term objectives and plans, KU will continue to provide multi-layered and priority support to NanoLSI through its concrete measures during the second half of the WPI grant period as described below:

Provision of Budgets

With the following budget and financial support, KU as the host institution will provide NanoLSI with substantial support beyond the commitment level of the host institution as of 2017.

- KU will contribute 400 million yen per year as personnel costs for researchers belonging to NanoLSI.
- KU will continue to support research expenses of 60 million yen per year through the on-campus COE system of KU as in the first half of the grant period.
- Ten million yen per year will be provided for the maintenance of the NanoLSI Research Building.
- For students belonging to the Graduate School of Frontier Science Initiative, Division of Nano Life Science, the educational unit that fosters future generations of NanoLSI researchers, 50,000 yen per month for a master's student and 100,000 yen per month for a doctorate student will be provided as a scholarship from KU's own funds. In addition, scholarships for the WISE Program for Nano-Precision Medicine, Science, and Technology, which was applied for by KU and funded by MEXT, will give priority to students in the Graduate School. Similarly, a scholarship aimed at improving the financial condition of doctorate students, the Fellowship for Fostering Top Scientists in Fused Disciplines, which MEXT will provide to KU, will give priority to students in the Graduate School.
- Regarding the amount of external funding for NanoLSI, after the number of affiliated researchers exceeded 70 and the research staffing was almost completed, 1,044,068,024 yen (allocation amount to NanoLSI, 701,070,766 yen) was secured in FY2019, and 1,027,050,241 yen (allocation amount, 700,988,457 yen) in FY2020. In addition to 16 PIs, 6 young researchers have been employed as Jr. PIs who will lead the next generation, and an excellent research team is in place. It is expected that external funds of around 1 billion yen can be secured each year also in the near future, out of the amount of which around 700 million yen will be expected to be allocated to NanoLSI.

Personnel Affairs

By preferentially applying the personnel measures described below to NanoLSI, KU will maintain the research focus of NanoLSI researchers and provide internationally competitive salary levels.

- KU will assign and maintain excellent full-time researchers (22 positions) with tenure, who will lead research promotion in NanoLSI for a long period beyond that of the WPI grant.
- By preferentially applying KU's Research Professor system to full-time researchers belonging to NanoLSI and exempting them from non-NanoLSI duties, KU will secure the research focus of NanoLSI full-time researchers.
- KU will maintain an internationally competitive salary level by applying a salary structure according to the performance of individual researchers, i.e., combining rigorous performance evaluation and evaluation-dependent salaries with NanoLSI's unique research allowance.
- Regarding the enrollment capacity of students (currently 6 students per year) of the Graduate School of Frontier Science Initiative, Division of Nano Life Science, enrollment will be increased from 6 to about 10 in both the master's and doctorate programs by consolidating the overall graduate school enrollment capacity of KU.

- The number of young researcher positions currently employed by WPI subsidies will be secured by using NanoLSI's abundant external funding.

Infrastructure development

By maintaining and developing the research infrastructure, KU will secure a world-class research environment for NanoLSI.

- NanoLSI is already officially positioned in the statutes of KU as an independent institute of KU. At the same time, the independence of NanoLSI is confirmed by securing the center director's discretionary power on personnel, budget and representation of NanoLSI. NanoLSI is also positioned as a permanent organization backed by KU's long-term strategy.
- The Facilities Department of KU will give priority to supporting the maintenance of the new NanoLSI research building. For the maintenance of 60 Bio-SPMs and 6 EMs deployed in the new building, a technician specializing in AFM and a technician specializing in EM will continue to be placed in NanoLSI. Both technicians are able to assist users of the equipment in English. In addition to these two technicians, one technician with a Ph.D. degree and another with a master's degree will be assigned to NanoLSI, making a total of four.
- As support for young and overseas researchers, a URA who supports acquisition of research funds by overseas researchers, and a URA who plans and operates outreach projects for researchers, such as the Bio-SPM Summer School, will continue to be assigned.
- The administrative system will be maintained in which all NanoLSI operations, such as research work, daily life, administrative procedures, and various communications from the office, are carried out in English. Instead of fixing the administrative staff assigned to NanoLSI, turnover will be assured by personnel transfer, positioning the NanoLSI Administrative Office as a place for OJT to carry out duties in an English environment.
- In order to maximize the research effort of researchers, a specialist will be assigned to take charge of website maintenance, revision of research content on the website and the planning and organization of research meetings such as international symposia.

2) How the host institution will establish a basic policy for the mid-to-long term direction of its organization and operation, one that restructures its existing organization in ways that give the center a permanent place within its organization. Please provide a concrete schedule for carrying out this organizational restructuring.

- As described in <Provision in host institution's mid-to-long-term plan>, KU clarifies the basic policy aiming at the formation of a world-class research center through interdisciplinary research and the organizational restructuring accompanying the formation of research centers. In KU's implementing research promotion measures based on that policy, NanoLSI will contribute to the progress of interdisciplinary research and the formation of research centers in KU through the transfer of established good practice.
- KU revised its statutes in FY2020, positioning NanoLSI as an independent institute alongside other faculties, supporting the permanent status of NanoLSI.

3) Ways in which the host institution will provide support to sustain the center as a world premier international research center after the WPI grant period ends.

- In order to maintain and develop NanoLSI over a long period of time as a world-class research institute,

it is important to secure excellent full-time researchers with tenure. KU has already completed the deployment of 22 full-time researchers with tenure, as announced at the WPI Interim Evaluation Site Visit. KU will maintain this deployment. These full-time researchers are engaged in research at NanoLSI and are also involved in graduate education or bachelor's degree education in order to contribute to the development of next-generation researchers.

4) How will a system be instituted under which the center's director is able to make substantive personnel and budget allocation decisions necessary to implementing the center project—a system, which in practice, will allow the center director autonomy in making decisions regarding the center's operation.

- In order to support the long-term status of NanoLSI and the leadership of the center director, the KU statutes were revised and NanoLSI became an independent institute in FY2020. This measure clarifies the autonomy of NanoLSI and the personnel, budget execution and representation rights of the Center Director of the NanoLSI.

5) Support that will be provided to the center director in coordinating with other departments within the host institution when recruiting researchers for the center, while giving reasonable regard to the educational and research activities of those departments.

- In launching NanoLSI in FY2017, KU negotiated with its departments, and by transferring full-time researchers belonging to those departments to NanoLSI or by concurrent appointment to NanoLSI and the original department, outstanding researchers in the fields of nanometrology, supramolecular chemistry, molecular biology, cancer research, pharmacy etc. were successfully gathered together in NanoLSI. While both researchers who have been transferred to NanoLSI and researchers who are concurrently appointed to other departments secure and share research efforts, those researchers are also involved in education of the Graduate School of Frontier Science Initiative, Division of Nano Life Science or the graduate school of their original departments, as well as having some involvement in the bachelor's degree education with its perspective for fostering future generation NanoLSI researchers. KU will continue to maintain this policy and system.

6) Flexibility that will be given in applying, revising, or outfitting the host institution's internal systems as needed for the center to effectively implement new management methods (e.g. English-language environment, merit-based pay, top-down decision making, cooperation in graduate education) unfettered by conventional modes of operation.

- KU positions NanoLSI as an institute responsible for pioneering and path-breaking roles in advancing system reforms. While NanoLSI has been preparing the research environment for the formation of a world-class research center, KU has been establishing and realizing a new research management environment in NanoLSI, by not being bound by conventional university management methods but by flexibly operating the existing system and giving the President new discretionary powers. These include top-down decision making by regular top leaders' meetings, a research-focused system for selected researchers, an evaluation-dependent annual salary scheme, a Jr. PI program for the young and brightest, administrative support in English for overseas researchers, graduate education supported by the research institute, etc. Based on these results, KU will extend the good practice and know-how established by NanoLSI to other on-campus research institutes and selected research groups.

7) The accommodation that will be given the center's infrastructural requirements (for facilities,

e.g., laboratory space; equipment; land, etc.).

- Concerning the research facility, KU completed the new NanoLSI Research Building in September 2020. The new building has a total floor area of 6840 m², consisting of a basement and 4 floors above ground. Researchers in the fields of nanometrology, supramolecular chemistry, computational science, and life science form a research core under one roof. The structural features of the new building include the installation of a dry area (empty moat) that protects the entire building from external vibrations propagating on the ground, and the installation of floating floors that prevent vibrations transmitted from inside the building at key points. Due to these features, high-precision anti-vibration measures are now possible that could not be realized at existing facilities.
- The facility of the NanoLSI building include 60 scanning probe microscopes (SPM) (48 atomic force microscopes, AFM, and 12 scanning ion conductance microscopes, SICM) and 6 electron microscopes (one transmission electron microscope, TEM and five scanning electron microscopes, SEM). Most of these microscopes are located in the basement, where there is less vibration, forming the research floor that is the hallmark of NanoLSI. In addition to SPMs and EMs, the research environment has been enhanced by an animal room, a treatment room and three P2-level laboratories. Furthermore, a shared chemistry laboratory has been established with a total of 16 draft chambers with high-speed variable air volume control (Variable Air Volume) with excellent energy-saving performance. In addition, in order to promote interdisciplinary research in the above four fields, a shared laboratory without partitions has been established on every floor. All explanations of how to use the experimental equipment and the reservation system are online and in English.
- Regarding the technicians, one expert in AFM who speaks three languages (English, Chinese and Japanese) and one expert in EM who is fluent in English are deployed exclusively for NanoLSI. In addition, one technician with a Ph.D. degree and another with a master's degree are involved in the NanoLSI research environment.

8) Other types of assistance that will be provided to give maximum support to the center in achieving its concepts and objectives and in becoming a world premier international research center in both name and deed.

- A monthly leaders' meeting, which is a top-down decision-making body, attended by the President and Vice President in charge of general affairs, finance, and facilities (KU side) as well as the Center Director and the Administrative Director (NanoLSI side) was held during the first half of the WPI grant period. This will continue during the second half of the WPI grant. These meetings ensure strong and flexible decision-making by the Center Director and close cooperation between KU headquarters and NanoLSI.

9) How the host institution will self-evaluate the good results of the system reforms achieved by the center and take the initiative in extending them to departments throughout its organization.

- KU will establish the Interfaculty Institute for Frontier Sciences and Research Integration (tentative name) in FY2022 by benefitting from the efforts and know-how of NanoLSI to form a research base in terms of personnel, budgetary and research infrastructure management system. This organization is composed of a group of interdisciplinary research institutes and a collection of selected research groups with the aim of forming a new world-class research center for interdisciplinary research and contributing to solving social problems through comprehensive knowledge. While maintaining its status as an

independent research institute, NanoLSI will contribute to the propagation of the good practice of NanoLSI throughout the university in cooperation with this Interfaculty Institute.

- KU is inspired by NanoLSI's efforts for interdisciplinary research, and will start reforming graduate school education from FY2022. This reform includes (1) mandatory laboratory rotation in the master's programs, (2) setting of required subjects across graduate schools such as "data science in society 5.0", innovation methodology, technology management, etc., (3) gradual implementation of the principle of admission to the doctorate programs by qualifying examination in order to convert all graduate schools into virtually five-year graduate programs, thus aiming to contribute to basic research and to develop research personnel with doctorate degrees who will contribute to the solution of social problems with comprehensive knowledge.

10) If the host institution has already established a WPI center, it should be fully supporting the maintenance and further development of the existing center and be capable, at the same time, of fully supporting the new center.

Not applicable.