

World Premier International Research Center Initiative (WPI)

Activities Report of the WPI Academy Center

(FY 2020 – FY 2023)

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Research Center	Research Center for Materials Nanoarchitectonics (MANA)		
Center Director	Takashi TANIGUCHI	Administrative Director	Yutaka WAKAYAMA

Common Instructions:

- * Unless otherwise specified, prepare this report based on the current (31 March 2024) situation of your Center.
- * Use yen (¥) when writing monetary amounts in the report. If an exchange rate is used to calculate the yen amount, give the rate.
- * Prepare this report within 10 pages (excluding the appendices, and including "Summary of State of WPI Academy Center Progress" (within 2 pages)).

Summary of WPI Academy Center's Activities (write within 2 pages)

7 years have passed since MANA became a WPI Academy center, and it continues to produce research results as a world-class research center fostered by the WPI program. In addition, MANA has been able to activate the international brain circulation by utilizing the research network it has established as an international hub for nanotechnology research. The following is an overview of the activities of the MANA.

The Center and its world-class research and fusion research

MANA is a WPI Academy center that promotes world-class research under the concept of "nanoarchitectonics" to create a new paradigm of nanotechnology and acts as a hub for international brain circulation in the field of nanotechnology. In the 5th medium- and long-term plan of NIMS, it was once again positioned as a research center specializing in fundamental research. The WPI-MANA has published a total of 3,225 papers during the four-year period from 2020 to 2023, maintaining the same level of publications as when the WPI project was promoted. The number of papers published will be maintained at the same level as when the WPI project was promoted. Among these, the number of papers in 2023 reached 766, with an average impact factor of 13.2, and the ratio of internationally co-authored papers reached 75.6%, maintaining the quality and internationality of research at a high level. Thus, MANA has already continued to produce world-class research results. Recent examples include the development of innovative thermoelectric materials and new computing devices for AI technology.

International research environment and international brain circulation

Under the leadership of the center's director, MANA has implemented several measures to stimulate research with the aim of promoting world-class research. These are largely due to the financial and human resources support provided by NIMS to MANA. On the other hand, the acceleration and expansion of the international brain circulation that MANA is promoting as a WPI Academy Center is also a driving force for MANA's research. For example, to further raise the level of MANA's research and to contribute to the promotion of brain circulation, we have appointed world-renowned researchers as satellite PIs to MANA, including Prof. Domitri Golberg of the Queensland University of Technology (Australia) in 2021 and Prof. Yusuke Yamauchi of the University of Queensland (Australia) in 2023 as a new satellite PI. As a result, MANA has 5 overseas satellites as of March 2024. Including these satellites, MANA is promoting the invitation of overseas researchers and the dispatch of MANA researchers to overseas institutions. In addition, MANA has concluded MoUs with overseas research institutions and continues to provide special support for invitations and dispatches. The center also promotes the holding of international conferences and workshops (including co-hosting). To create such an international environment, it is necessary to standardize the implementation of work in English. In fact, MANA has established a system in which English is the official language that supported by bilingual staff.

Organizational management and reforms, spillover of system reforms to host institutions

Currently, MANA is managed by a MANA executive consisting of four members: the director, two deputy directors, and the Administrative Office Chief. In particular, the center is managed under the leadership of the director. Monthly MANA management meetings are held to ensure that information is shared throughout the center. The administrative department has 2 sections, one in charge of outreach and the other in charge of general affairs, which are responsible for international brain circulation and public relations activities as well as daily administrative support. In particular, the general affairs section has been staffed with employees who are well versed in their duties, enabling efficient and accurate execution of operations. This system was modeled in the 5th medium- and long-term plan of NIMS, which began in 2023, and led to the establishment of administrative offices at all seven NIMS research centers, thereby promoting efficiency and equalization of operations throughout the host institution.

Maintain and enhance the WPI brand and outreach activities

The branding of the WPI is done through research and outreach activities, and MANA's activities are centered on "presenting world-class research capabilities and results," "disseminating and collecting information through a network of former WPI members and others involved," "educating the next generation," and "clarifying the relationship between these activities and the WPI". The activities of the WPI are centered on the following three points. Specifically, the WPI supports the organization (co-sponsorship) of international symposiums and workshops, and scientific awareness activities for students and the public.

To showcase MANA's achievements, notable research results are distributed online as Research Highlights. The international symposiums that MANA sponsors each year have been affected by the Corona disaster after 2020, making it difficult to hold the symposiums on site as in the past. However, MANA has continued to disseminate research results and build networks by establishing online and other methods.

Ensuring the medium- and long-term development of the base

The 5th medium- and long-term plan of NIMS established seven research centers within NIMS, of which MANA is one, and positioned it as a research center devoted to fundamental research to clarify the difference in its role from other centers. Reflecting this mid- to long-term organizational restructuring within NIMS, personnel transfers among the centers were also activated to promote the renewal of MANA in terms of research and personnel. In other words, this is a measure to incorporate the medium- to long-term development of MANA into the medium- to long-term development of NIMS. This is an extremely important measure for maintaining and promoting our world-class basic research.

Others: Acceleration of International Brain Circulation

Based on the position that the promotion of international brain circulation is necessary to maintain the world's highest level of research, the following efforts were made.

- Strengthening MANA overseas satellites: Appointed Prof. Domitri Golberg of Queensland University of Technology (Australia) in 2021 and Prof. Yusuke Yamauchi of the University of Queensland (Australia) in 2023 as new satellite PIs to human resource network was strengthened.
- Invitation and Dispatch Programs: Short-term invitation and dispatch programs have been continued to promote personnel exchange with overseas research institutions. These programs are intended for tenured scientists and are intended to develop international collaboration based on MoUs into more sustainable joint research.
- International Symposiums and Workshops: Symposiums and workshops are held to bring together researchers from Japan and overseas and to provide opportunities for active exchange of personnel. The symposiums and workshops are intended not only to provide a forum for exchanging ideas and information on the latest research trends, but also to provide an opportunity to discover new research themes and initiate joint research projects in the future.

* Describe clearly and concisely the progress being made by the Center from the viewpoints below.

- In addressing the below-listed 1-8 viewpoints, place emphasis on the following:

- (1) Whether research standards and operation of the Center is maintaining a "world premier" status.
- (2) Whether the Center participate and cooperate to the activities to advance the overall development of the WPI Program and to promulgate its achievements.

1. Overall Image of Your Center

- Describe the Center's current identity and overall image.
- List the Principal Investigators in Appendix 2, diagram the Center's management system in Appendix 3-1, enter the number of center personnel in Appendix 3-1a, and enter center funding in Appendix 3-2.

In the nine and a half years since its establishment (October 2007 - March 2017), MANA has grown into a world-class research center in related research fields, and since April 2017, as a WPI Academy center, it has been working to further improve its research standards by leveraging its experience in forming the center in the 5th medium- and long-term plan of NIMS, which began in April 2023, the role of the center as a research center for basic fundamental research is clearly defined within the host institution.

NIMS, MANA's host institution, is Japan's leading research institute in the field of materials science, and MANA was launched based on a center design focused on materials research and development, emphasizing the importance for materials science of effectively utilizing nanotechnology (and nanoscience) to strongly promote research and development of new materials. Nanotechnology has been considered a key element of conventional materials research and development. In its design, the center advocated that the true power of nanotechnology cannot be effectively utilized unless it is properly recognized that nanotechnology is qualitatively different from conventional microtechnology, and that a new concept of "nanoarchitectonics" (nanoscale architecture) is necessary to express this fact in a straightforward manner. This concept of nanoarchitectonics is what makes MANA's research distinctive and what has made MANA unique among the world's nanotechnology research institutions.

MANA is working with the following four missions to realize its vision of "pioneering a new paradigm of nanotechnology for a better tomorrow":

1. world-class research on new materials development based on nanoarchitectonics
2. development of new research fields through fusion of different research disciplines
3. training and securing the next generation of young researchers
4. formation of international research cooperation networks

Since its establishment until FY2015, MANA's research organization has been organized into four fields: two fundamental fields (nanomaterials and nanosystems) and two exit-oriented fields (nanopower and nanolife), with a view from basic to applied research. Furthermore, in 2016, a new theoretical field was established, and research was carried out in a total of five fields. From FY2017, MANA was positioned as a center in charge of basic and fundamental bottom-up research within NIMS, in line with the organizational structure established in the 4th medium- and long-term plan of NIMS. Accordingly, research fields have been reorganized into three basic fields (nanomaterials, nanosystems, and nanotechnology). In the 5th medium- and long-term plan of NIMS started in 2023, MANA was reorganized into two fundamental research fields (quantum materials and nanomaterials), reflecting the government's science and technology basic plan. During this reorganization, application-oriented research that has developed from basic research has been transferred from MANA to other centers. While MANA is based on such group research, researchers belonging to each field are not limited to their own group but are encouraged to work together to develop their own research. MANA encourages and supports researchers in each field to propose and promote fusion research with other groups and fields, rather than staying within their own groups. In addition, MANA appoints particularly outstanding young researchers as "independent researchers" with the intention that they will become the core of fusion research and provides support to encourage them to promote original and challenging research without being affiliated with a group. Under the new concept of "nanoarchitectonics," MANA is steadily advancing group research, while at the same time encouraging and supporting fusion research to create new research and challenging research based on the free ideas of everyone.

2. Advancing Research of the Highest Global Level

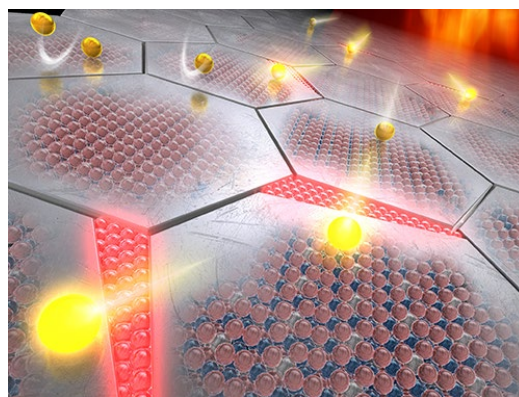
- Describe what's been accomplished in the Center's research objectives and plans.
- In Appendix 1, list the papers underscoring those research achievement and list the Center's research papers published in 2020-2023 in a manner prescribed in Appendix A.

At MANA, world-class researchers are contributing to the creation of world-class research results and supporting the further development of world-class research. At the same time, the MANA emphasizes the creation of new and original research, especially the proposal and execution of new research, especially by young researchers. It is undoubtedly important to nurture the seeds of new research into future world-class research. Recent new research results obtained based on this basic approach will be described.

- Development of innovative thermoelectric materials

The Thermal Energy Materials Group, led by group leader Dr. Takao Mori, has successfully improved the $\text{Mg}_3(\text{Sb}, \text{Bi})_2$ alloy, opening a new path for efficient utilization of thermal energy. L. Wang, T. Mori, et. al, Realizing High Thermoelectric Performance in N-Type $\text{Mg}_3(\text{Sb}, \text{Bi})_2$ - Based Materials via Synergetic Mo Addition and Sb -Bi Ratio Refining, *Advanced Energy Materials*, 2301667, 13, (2023).

Thermoelectric (TE) materials, which convert heat into electricity, have shown great promise as one of the materials that could contribute to solving the global energy crisis. These materials are known to operate based on several factors, such as electron and phonon scattering at grain boundaries formed between different crystal orientations, and we have conducted research with the idea that the conversion efficiency from heat to electricity can be further improved by using various doping techniques. Among the many thermoelectric materials, $\text{Mg}_3(\text{Sb}, \text{Bi})_2$ alloys containing magnesium (Mg), antimony (Sb), and bismuth (Bi) have attracted much attention. There have been several cases in which the introduction of transition metals



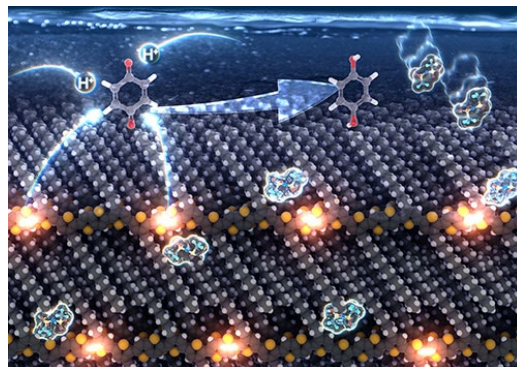
slightly improved thermoelectric conversion performance, and there has been a need to elucidate and utilize the effects of transition metals on these alloys. Therefore, Mori et al. succeeded in improving the performance of the $\text{Mg}_3(\text{Sb}, \text{Bi})_2$ alloy by adding molybdenum (Mo), a transition metal. They clarified how the introduction of molybdenum modulates the size and band structure of crystal particles and promotes the movement of electrons. Furthermore, the ratio of antimony to bismuth was optimized to introduce structural defects in the crystal structure, limit phonon transport, reduce phonon group velocities, and increase atomic disorder, resulting in a particularly distinctive improvement in material performance. The unireg devices fabricated by this method achieved a very high performance of 12% compared to existing devices. The results of this research are expected to contribute to solving energy and environmental problems by providing a new means of utilizing waste heat in industrial activities, transportation, and daily life. In addition, $\text{Mg}_3(\text{Sb}, \text{Bi})_2$ based thermoelectric materials use only abundant and low-cost elements compared to other thermoelectric materials such as PbTe and GeTe alloys, which contain rare and toxic elements. Effective utilization of waste heat is very important from the perspective of increasing energy consumption and addressing environmental issues, and thermoelectric devices can be a promising solution to these issues.

- Breakthrough in flexible electronics: doping technology for organic semiconductors

Impurity doping technology has long been established for silicon and other semiconductor materials, but it is an unexplored technology for organic semiconductors, which play a key role in flexible electronics. The Supermolecules Group to which Yamashita, Ariga, and their colleagues belong has pioneered a technique for doping polymer semiconductors by simply immersing them in an aqueous solution.

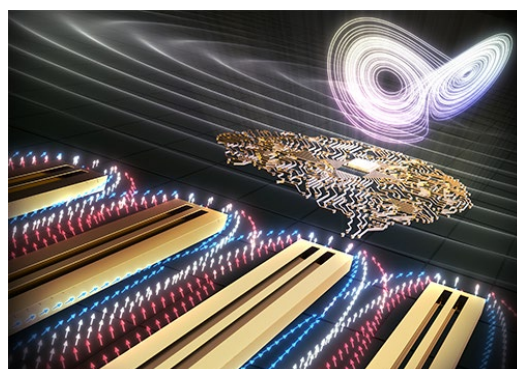
Yamashita, Ariga, Takeya, et. al, Doping of molecular semiconductors through proton-coupled electron transfer, *Nature*, 622, 285-291 (2023).

Organic semiconductors made of polymers and other materials are important materials for flexible electronics, but there have been problems in controlling electrical conductivity and other properties through doping. Impurity doping uses dopants that cause redox reactions with semiconductors, but these materials are deactivated by moisture and other factors. To address this issue, this study established a simple method for controlling doping by simply immersing an organic semiconductor thin film in an aqueous solution using a reaction known as proton-conjugated electron transfer, which is found in biochemistry. The conductivity and doping levels were precisely controlled by changing the pH. This method, which is also suitable for manufacturing processes, is expected to contribute to the realization of various flexible devices including sensors, solar cells, and displays.



- High-performance physical computing device based on chaotic behavior of spin waves
The Ionic Devices Group, to which Tsuchiya and Terabe belong, has pioneered a new computing mechanism by highly controlling spin waves. This could be a breakthrough device operation that contributes to the development of future AI technology. Tsuchiya, Terabe, et. al, Experimental Demonstration of High-Performance Physical Reservoir Computing with Nonlinear Interfered Spin Wave Multidetector, *Advanced Intelligence Systems*, 5, 2300228, 2023.

The demand for compact AI devices with low power consumption and high computational performance is increasing toward the realization of Society 5.0, and research on physical computation, which uses physical phenomena to process information efficiently, is progressing. Theoretical calculations have predicted that high-performance information processing can be achieved by using spin-wave interference in magnetic bodies, but the feasibility and actual performance have been unknown. In this study, they experimentally demonstrated the world's first physical operation based on spin-wave interference. They confirmed that

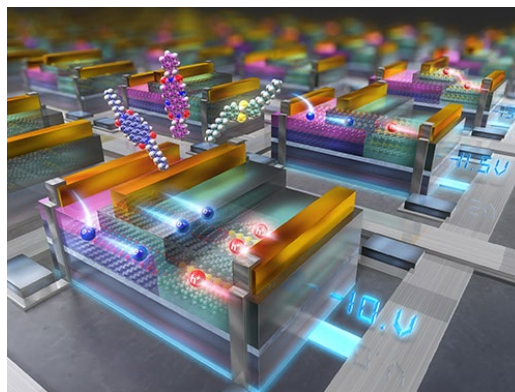


it has extremely high computational performance due to its outstanding chaotic nature and huge storage capacity, and demonstrated the possibility of realizing overwhelmingly high-performance AI devices based on this technology. The technology can be used for all kinds of pattern recognition and judgment, including classification and future prediction of data such as images, people, voice, and smells, and is expected to be applied to terminal devices with AI functions that are highly versatile, fast, and low power consumption.

- Multiple-valued logic circuits for the development of innovative computing architectures
The Quantum Device Engineering Group, to which Hayakawa and Wakayama belong, has constructed a new transistor structure combining different organic semiconductors and pioneered multi-level arithmetic circuits that enable a dramatic increase in device integration. Hayakawa, Wakayama, et. al, Antibipolar Transistors with Double Negative Differential Transconductances for Organic Quaternary Logic Circuits, *Advanced Functional Materials*, 33, 2213899 (2023).

Organic integrated circuits are expected to be applied to human-friendly mobile information terminals such as healthcare sensors and electronic tags, taking advantage of the lightweight, flexible, and biocompatible characteristics of organic materials. However, the level of integration of organic integrated circuits is extremely low because existing microfabrication processes

cannot be applied to them. Therefore, there is a need to develop high-performance technology for organic integrated circuits that does not rely solely on device miniaturization. In this study, a four-valued logic circuit was demonstrated using a special organic transistor that exhibits negative differential transconductance at room temperature, called an "anti-ambipolar transistor". Logic circuits requiring six or more transistors in conventional CMOS technology were realized with only two transistors. This achievement means that the circuit design guidelines for conventional devices can be fundamentally reformed and will lead to significantly higher integration and performance of organic integrated circuits in the future.



3. Facilitating Interdisciplinary Research Activities

- Describe the content of measures taken by the Center to facilitate interdisciplinary research activities. For example, measures that create an environment that will facilitate doing joint research by researchers in differing fields.
- Describe the contents and results of interdisciplinary research activities yielded by the measures described above.

Although the basic concept of nanoarchitectonics (architecture of nano) is shared among researchers, researchers with different backgrounds are gathered at MANA. We are convinced that it is extremely important to promote interdisciplinary fusion research in such an environment to achieve new research results. Therefore, MANA has promoted interdisciplinary fusion research by establishing the "Challenging Research Program" and the "Theorist-Experimenter Pairing Program". Some examples of these programs are introduced below. First, an expert in materials synthesis (Dr. Kazunari Yamaura, Quantum Solid State Materials Group) and an expert in theoretical calculations (Dr. Masanori Kono, Quantum Material Properties Group) collaborated to analyze the fundamental properties of the antimagnetic material Mn_3Sb . While analyzing the origin of the anomalous Hall effect that appears in this material, they explored its potential as a future memory material. Another interdisciplinary collaboration between an expert in 2D layered material synthesis (Dr. Ryo Kitaura, 2D Quantum Materials Group) and an expert in materials informatics (Dr. Ryo Tamura, Quantum Properties Simulation Group) involved the optimization of deposition conditions for 2D layered materials by incorporating machine learning methods. This work presents an efficient method based on theoretical predictions, instead of the conventional empirical condition search. Dr. Yutaka Wakayama, who specializes in organic electronics, demonstrated the operation of a new arithmetic device in collaboration with Dr. Junko Aimi (Molecular Mechatronics Group), who belongs to the Research Center for Macromolecules and Biomaterials within NIMS. By incorporating polymer materials with memory effect into a unique organic transistor, they established a new arithmetic mechanism that is different from conventional Neumann-type arithmetic devices. These research results are at the budding stage at this point, and are not yet ready for application. However, we recognize that these results were achieved through collaboration between different fields, such as theory and experiment, fundamentals and applications, and physics and chemistry, and that these activities should be continued as a WPI center in the future.

4. Maintaining an International Research Environment

- Describe what's been accomplished in the efforts to raise the Center's recognition as a genuine globally visible research institute, along with innovative efforts proactively being taken, including the following points, for example:
 - Efforts being developed to maintain an international research environment based on the analysis of number and state of world-leading, frontline researchers; exchanges with overseas entities
 - Proactive efforts to raise the level of the Center's international recognition
 - Efforts to make the Center into one that attracts excellent researchers from around the world (such as creating of an environment in which researchers can concentrate on their research, providing startup research funding, supporting efforts that will foster young researchers and contribute to advancing their career paths, and arranging support system for the research activities of overseas researchers.)
 - Consolidation of the administrative structures to support implementing the efforts described above
- In Appendix 3-1, describe the state of cooperation with overseas satellites, and list the main international research meetings held by

the Center.

Overseas satellites play an important role in increasing MANA's international research level and the international nature of its activities in general. The number of overseas satellites was 5 in FY2017 (1 in Finland, 2 in the U.S., 1 in the U.K., and 1 in France), but in FY2018, two additional locations were added in the field of nanomaterials, the University of Strasbourg and Pennsylvania State University (to be changed to the University of Pennsylvania in 2019) to further strengthen the international research environment. Further strengthening the international research environment, we welcomed Prof. Domitri Golberg of the Queensland University of Technology, Australia in 2021 and Prof. Yusuke Yamauchi of the University of Queensland, Australia in 2023 as new satellite PIs. As a result, MANA now has five overseas satellites as of March 2024. In this way, MANA is frequently renewing its overseas network while strengthening its collaborative structure. As a typical example, the Prof. David R. Bowler group at UCL in the U.K. and the Quantum Materials Simulation Group led by Dr. Miyazaki have been promoting active collaboration through continuous exchange of personnel in both directions. Dr. Christian Joachim of CNRS-CEMES, France, and Prof. Domitri Golberg of Queensland University of Technology, Australia, also stay at MANA for about two weeks every year to promote collaborative research. The results of their work are published as co-authored papers. In this way, the activities of the satellite PIs have made a significant contribution to improving the level of research at MANA.

In addition to the above, MANA operates a program of inviting overseas researchers and sending MANA researchers abroad for a period ranging from one week to a maximum of three months. The program had been inactive for about three years due to the Corona disaster that began in 2020, but the program has been revitalized since October 2022, when the Japanese government relaxed its border control measures against foreign traffic. In FY2022, there were 3 invitations and 3 dispatches, and in FY2023, there were 6 invitations and 1 dispatch. We also recognize that inviting doctoral students from overseas is important for promoting the mobility of research personnel in the future. This is done through the internship system operated by NIMS itself, which also ensures an international research environment at the student level.

In order to implement the international activities described above, MANA maintains a bilingual environment in which all permanent and fixed term staff are fluent in English and Japanese, not only in research positions but also in administrative positions. These measures are spreading throughout NIMS. The percentage of non-Japanese researchers at MANA has been stagnant for some time after 2020, reflecting the impact of the Corona disaster, but has recovered to around 30% as of March 2023. Furthermore, as of the end of FY2023, 20 MANA retired research staff members have been appointed as professors or associate professors at NIMS affiliated graduate schools (established at Hokkaido University, University of Tsukuba, Waseda University, Kyushu University, Yokohama National University, and Osaka University), accepting excellent doctoral students from Japan and abroad as research personnel and making significant contributions to MANA's research activities.

5. Making Organizational Reforms

- Describe distinctive effort in managing research operation and administrative organization, such as the strong leadership that the director is giving on the Center's operation, strong performance by the administrative director who provides the center director with strong administrative and managerial support, and division of roles and authority between the Center and its host institution.
- Describe the ripple effects that activities to disseminate experience and know-how accumulated by the Center, such as the followings, have/had on the host institution (or other research institutes, if any):
 - System reforms made through the Center's leading activities to its research operation and administrative organization
 - Experience and know-how accumulated by the Center as it have worked to establish itself as top world-level research institutes.
- Other than the above, give examples, if any, of cooperative activities by the Center and the whole WPI Program or other WPI centers, to disseminate experience and know-how accumulated by the WPI program and/or the WPI centers.

Transition of the base management system

In FY2020~2021, Dr. Takayoshi Sasaki served as the center director, Dr. Tomonobu Nakayama and Dr. Yutaka Wakayama served as deputy directors of the center, and Dr. Tomonobu Nakayama also served as the administrative director. Dr. Takashi Taniguchi took up the position of director in the middle of 2021, and the deputy directors were Dr. Mori Takao and Dr.

Wakayama Yutaka (who also serves as administrative director) in FY2022. In FY2023, the 5th medium- and long-term plan of NIMS began, and the entire NIMS organization was reorganized, with director Taniguchi, deputy director Takao Mori, deputy director Naoki Fukada, and administrative office chief Yutaka Wakayama serving as MANA executives.

Decision-making mechanism

The director, deputy directors, and the administrative office chief work together to make decisions on matters related to MANA's management policies, personnel exchange programs, and public relations activities. These decisions are communicated to group leaders and independent researchers through the MANA center meeting to ensure that the leadership of the director is exercised. At the Center Meeting, in addition to MANA's own management measures, the information and requests from NIMS, the host institution, are also thoroughly communicated. When implementing various measures and responding to requests from NIMS, the administrative office chief is in charge of necessary administrative procedures and coordination of implementation details according to the situation, and the director provides the final confirmation and approval. All MANA members can freely discuss their opinions and requests with the director and deputy director, and the director and deputy director hold MANA executive meetings as needed, utilizing online meetings to share information and make use of it in the management of the center.

In order to maintain and develop MANA's world-class research activities without hindrance, the formulation of research-related policies and guidance and advice to researchers are particularly important. To ensure the proper and smooth implementation of this, "group hearings" have been ongoing since FY2017 under the leadership of the center's director. The main objective is for each group leader and independent researcher to meet individually with MANA executives each year for a frank exchange of views. This has been very helpful in understanding the research environment (budget, experimental space, personnel, etc.) and research promotion issues/concerns faced by the research sites, as well as the director's leadership in response to these issues.

Ripple Effects on Host Institutions

● MANA made permanent as NIMS research center

MANA is both a WPI center and one of the seven research centers in NIMS that has been made permanent within NIMS. The role of MANA within NIMS was clarified as fundamental research and bottom-up research. While maintaining MANA's activities as a WPI center, the management structure was made equal to that of other research centers in NIMS to promote a level playing field.

● Administrative offices established at each NIMS center

As part of the 5th medium- and long-term plan of NIMS started in April 2023, all seven research centers at NIMS have established administrative offices. This is an effort to extend the same effect to other centers, using the demonstration that the MANA administrative office contributes not only to researcher support but also to the efficiency of administrative operations of the host institution itself as a model. The operations of each center's administrative office vary according to the circumstances of each center, and although smaller in scale than MANA, the importance of researcher support is steadily spreading.

● Independent researcher system

The independent researcher system, which started as MANA's own system, also spread to NIMS as a whole: a system was established whereby NIMS selects particularly outstanding individuals to become independent researchers from among newly hired young researchers and existing young researchers. With this spillover to host institutions, the authority to determine independent researchers was transferred to NIMS. As a result, an environment was established in which young researchers assigned to many centers, not limited to MANA, could freely conduct research, as many of the independent researchers recognized by NIMS were assigned to MANA. Reflecting this measure, the number of independent researchers at MANA itself is decreasing (4 as of March 2024), but the number of independent researchers at NIMS is increasing (13 as of

March 2024).

- **Short-term invitation system**

MANA has been operating an invitation system to promote collaborative research by inviting up-and-coming young researchers in overseas faculty positions. This system was further developed into the "NIMS Global Collaboration Fellowship Program," which is now firmly established within NIMS itself. NIMS also accepts invitations for doctoral students who will work with overseas researchers, and selection is made with an eye toward the establishment of collaborative centers. MANA is implementing a flexible international brain circulation system by combining this new NIMS system with MANA's own invitation system, which ensures flexibility in the selection of the recipients of invitations.

Support by host institutions

NIMS continues to maintain 90 permanent staff positions as human resources and allocates research and office space accordingly. Total 2 billion yen in operating grants from NIMS to MANA in FY2023 has been allocated to support basic research activities for quantum materials and nanomaterials fields. Both infrastructure support and budget support are among the largest in NIMS. These supports have helped each researcher to activate their research activities, and as a result, 1.2 billion yen in competitive funds have been obtained. In addition, the host institution supports 60 million yen in personnel expenses for about 25 administrative staff members in the administrative office. This budget support is promoting stable administrative operations and leveling the playing field.

6. Efforts expected to WPI Academy Center to Enhance and Amplify the Visibility and Brand of the Overall WPI Program

- Describe how the Center's outreach activities have contributed to enhancing and amplifying the visibility and brand of the WPI program. Describe the successful cases of the Center's outreach activities in Appendix 4, and enter the number of activities in Appendix 4a.
- Other than the above, describe, if any, the activities and their concrete contents that have contributed to the enhancement and amplification of the visibility and brand of the WPI program (such as holding a large international research meeting, collaborative activities with multiple WPI centers). If you have already provided this information, please indicate where in the report.
- Describe the Center's efforts in making it a place that expands and accelerates the international circulation of the world's best brains. Give their success cases and describe their concrete contents and effect in narrative.
- Describe examples, if any, of cooperative activities by the Center and the whole WPI Program or other WPI centers, to disseminate experience and know-how accumulated by the WPI program and/or the WPI centers.

Utilization of wire distribution services

MANA uses a wire-distribution service to disseminate MANA's results, which are particularly noteworthy. Specifically, the MANA distributes research results in articles for the public under the title of "Research Highlights". The use of the wire services has resulted in the publication of the distributed information on numbers of news sites and has greatly expanded the audience for the articles. Because viewers access information "to read", this means of results dissemination can accurately convey information to interested audiences. This feature is a major advantage in promoting the WPI brand.

International symposiums and workshops

Until 2019, the MANA International Symposium was recognized as a high-level international meeting that brought together many of the world's top researchers, with 300-400 participants each time. However, the 13th MANA International Symposium, which was scheduled to be held in March 2020, was affected by the new coronavirus infection, and special measures were taken to cancel the on-site meeting and distribute the presenters' research summaries to the registrants to be considered as the event. Since then, the symposium was held online in 2021, and was held as a hybrid meeting combining online and on-site meetings in 2022. While it cannot be denied that the number of opportunities for researchers to gather onsite has thus decreased, there was also the benefit of accumulating expertise in disseminating research at online conferences. As an example, an event called the WPI-MANA Virtual City of Workshop was held, where MANA researchers focused on their own research topics and held intensive workshops in an online format during a certain period in November 2021. A total of seven workshops, "Organic Electronics Workshop," "Nanomaterials for Photoenergy Conversion - Light

Generation and Sensing," "Nanomaterials for Photoenergy Conversion - Light Generation and Sensing," "International Workshop on Frontier of Liquid Science," and so on, plus four invited seminars are held. The online format reduced the burden of organizing these events and provided an effective means of disseminating research results.

Scientific awareness activities

For the promotion of science and technology in Japan, we recognize that gaining support from the public and increasing interest in science among young people, who will be responsible for the future, are two of the responsibilities placed on the WPI, which promotes world-class research. For example, MANA has been actively promoting the visit of students and external research institutions, both domestic and international, and participation in the public open house organized by NIMS. Another educational activity that deserves special mention is the nano-car race. This event was held by Dr. Christian Joachim, one of the satellite PIs, at CNRS-CEMES in France in March 2021, calling for researchers from all over the world. In this event, researchers competed to move molecules adsorbed on a metal surface in an ultrahigh vacuum using a probe microscope tip, and to see how far the molecules could move the molecule within 24 hours. While this is an extremely advanced basic science that requires collaboration among different fields such as molecular chemistry, surface physics, measurement science, and theoretical calculation, it was an interesting event with a playful spirit that appealed to the public for the fun of science.

7. Effort to Secure the Center's Future Development over the Mid- to Long-term

- Address each of the following items that have been done to secure mid- to long-term center development:
 - Contents of the measures taken by the host institution to support maintaining the activities of the Center (such as securing financial and personnel resources, coordination among host institution to bring together in-house researchers, in-kind provision and/or facilities afforded in terms of usage of building, lab space and other equipment, new management reform carried out after the funding period ends).
 - Actions and measures taken to sustain the Center as a world premier international research center.

NIMS has clearly positioned MANA as a research center devoted to basic fundamental research and has created a system whereby research with promising applications is transferred from MANA to other NIMS research centers for development. This inevitably promoted the renewal of MANA, and at the same time, MANA came to function as an important place for the creation of seeds within NIMS. In this way, MANA's position in the medium- and long-term plan of NIMS is clearly defined, while the circulation of human resources is continuously maintained through organizational restructuring and personnel transfers.

Various resources necessary to continue research activities are provided to MANA in the same manner as NIMS does to other centers. This includes measures for the use of infrastructure such as human resources and research space. In addition to this, as a special measure to ensure the medium- to long-term development of MANA as a world-class research center, a 100 million yen/year operating subsidy (president's special support), which can be used at the discretion of the center's director, was allocated until FY2022. This special measure was continued from FY2017 when MANA became an Academy center but was discontinued from FY2023 onward as it was judged that the research infrastructure had been sufficiently developed.

8. Others

- In addition to the above1-7, note any of the Center's notable efforts and activities.

Since MANA was established as a WPI center in 2007, several systems that have been tried, such as collective support by the administrative office, independent researcher system, and invitation system from overseas, have spread to the host institution. This is a great achievement for a WPI center with organizational reform as one of its missions. On the other hand, seven years after becoming an Academy Center, the role of MANA as one of the seven research centers within NIMS has become firmly established, and special measures for MANA have been abolished and organizational management has been leveled within NIMS. The period after 2020 was a transitional period.

Appendix 1 List of Center's Major Research Achievements

1. List of Major Refereed Papers

*List **up to 20 papers** representative of the Center's research activities during the period between FY 2020 and FY 2023, and give brief descriptions (within 5 to 10 lines) of them.

*For each, write the author name(s); year of publication; journal name, volume, page(s) (or DOI number), and article title. Any listing order may be used as long as format is the same. If a paper has many authors, underline those affiliated with the Center.

*If a paper has many authors (say, more than 10), all of their names do not need to be listed.

Note: Authors with MANA affiliation are underlined.

1. (Highly Cited Paper; 312 Times Cited, Web of Science, Review, 2020-559)

Z.J. Wang, H. Song, H.M. Liu, J.H. Ye, *Coupling of Solar Energy and Thermal Energy for Carbon Dioxide Reduction: Status and Prospects*, Angewandte Chemie - International Edition **59**(21), 8016 (2020).

doi: 10.1002/anie.201907443

Brief Description: Enormous efforts have been devoted to the reduction of carbon dioxide (CO₂) by utilizing various driving forces, such as heat, electricity, and radiation. Recent pioneering studies from several groups, including us, have demonstrated that the coupling of solar energy and thermal energy offers a novel and promising strategy to promote the activity and/or manipulate selectivity in CO₂ reduction. We clarify the definition and principles of coupling solar energy and thermal energy, and comprehensively review the status and prospects of CO₂ reduction by coupling solar energy and thermal energy. The aim of this Review is to promote understanding towards CO₂ activation and provide guidelines for the design of new catalysts for the efficient reduction of CO₂.

2. (Highly Cited Paper; 238 Times Cited, Web of Science, Article, 2020-548)

C.H. Wang, J. Kim, J. Tang, J. Na, Y.M. Kang, M. Kim, H. Lim, Y. Bando, J.S. Li, Y. Yamauchi, *Large-Scale Synthesis of MOF-Derived Superporous Carbon Aerogels with Extraordinary Adsorption Capacity for Organic Solvents*, Angewandte Chemie - International Edition **59**(5), 2066 (2020).

doi: 10.1002/anie.201913719

Brief Description: Carbon aerogels (CAs) with 3D interconnected networks hold promise for application in areas such as pollutant treatment, energy storage, and electrocatalysis. We report an eco-friendly method for the scalable synthesis of ultralight and superporous CAs by using cheap and widely available agarose (AG) biomass as the carbon precursor. The resulting CAs exhibit significant potential for application in the adsorption of organic pollutants.

3. (Highly Cited Paper; 158 Times Cited, Web of Science, Review, 2020-020)

K. Ariga, X. Jia, J. Song, J.P. Hill, D.T. Leong, Y. Jia, J. Li, *Nanoarchitectonics beyond Self-Assembly: Challenges to Create Bio-Like Hierarchic Organization*, Angewandte Chemie - International Edition **59**(36), 15424 (2020).

doi: 10.1002/anie.202000802

Brief Description: Incorporation of non-equilibrium actions in the sequence of self-assembly processes would be an effective means to establish bio-like high functionality hierarchical assemblies. As a novel methodology beyond self-assembly, nanoarchitectonics has been applied to this strategy. The application of non-equilibrium factors to conventional self-assembly processes is discussed on the basis of examples of directed assembly, Langmuir–Blodgett assembly, and layer-by-layer assembly. Methodologies described in this review article highlight possible approaches using the nanoarchitectonics concept beyond self-assembly for creation of bio-like higher functionalities and hierarchical structural organization.

4. (Highly Cited Paper; 441 Times Cited, Web of Science, Article, 2021-419)

J.M. Park, Y. Cao, K. Watanabe, T. Taniguchi, P. Jarillo-Herrero, *Tunable strongly coupled superconductivity in magic-angle twisted trilayer graphene*, Nature **590**(7845), 249 (2021).

doi: 10.1038/s41586-021-03192-0

Brief Description: Moiré superlattices have recently emerged as a platform upon which correlated physics and superconductivity can be studied with unprecedented tunability. We realize a moiré superconductor in magic-angle twisted trilayer graphene, which has better tunability of its electronic structure and superconducting properties than magic-angle twisted bilayer graphene. Our results establish a family of tunable moiré superconductors that have the potential to revolutionize our fundamental understanding of and the applications for strongly coupled superconductivity.

5. (Highly Cited Paper; 160 Times Cited, Web of Science, Article, 2021-225)

Y.V. Kaneti, Y.N. Guo, N.L.W. Septiani, M. Iqbal, X.C. Jiang, T. Takeji, B. Yulianto, Z.A. Alothman, D. Golberg, Y. Yamauchi, *Self-templated fabrication of hierarchical hollow manganese-cobalt phosphide yolk-shell spheres for enhanced oxygen evolution reaction*, Chemical Engineering Journal **405**, 126580 (2021).

doi: 10.1016/j.cej.2020.126580

Brief Description: Hierarchical nanostructures with hollow architectures can provide rich active sites, improved transport of ions, and highly robust structure for electrochemical applications. In this work, we report the self-templated fabrication of hierarchical manganese-cobalt phosphide (Mn-Co phosphide) yolk-shell spheres using highly uniform cobalt glycerate spheres as sacrificial templates. The proposed self-sacrificial templating strategy will provide useful guidance for future construction of hollow inorganic metal nanostructures with yolk-shell morphology for energy storage and conversion applications.

6. (Highly Cited Paper; 149 Times Cited, Web of Science, Article, 2021-701)

S. Song, H. Song, L.M. Li, S.Y. Wang, W. Chu, K. Peng, X.G. Meng, Q. Wang, B.W. Deng, Q.X. Liu, Z.A. Wang, Y.X. Weng, H.L. Hu, H.W. Lin, T. Kako, J.H. Ye, *A selective Au-ZnO/TiO₂ hybrid photocatalyst for oxidative coupling of methane to ethane with dioxygen*, Nature Catalysis **4**(12), 1032 (2021).

doi: 10.1038/s41929-021-00708-9

Brief Description: Direct oxidation of methane to valuable chemicals is a great challenge as catalysts with both high activity and selectivity for the activation of inert C–H bonds are required. Here, we report the highly efficient and selective photo-oxidation of methane to ethane with dioxygen in a flow reactor using a Au nanoparticle (NP) loaded ZnO/TiO₂ hybrid. Detailed characterizations and theoretical studies show that the formation of heterojunctions between ZnO and TiO₂ leads to enhanced photocatalytic activity, while maintaining high selectivity owing to the weak overoxidation ability of the main component ZnO.

7. (Highly Cited Paper; 118 Times Cited, Web of Science, Review, 2021-173)

H. Hosono, M. Kitano, *Advances in Materials and Applications of Inorganic Electrides*, Chemical Reviews **121**(5), 3121 (2021).

doi: 10.1021/acs.chemrev.0c01071

Brief Description: Electrides are materials in which electrons serve as anions. Exploration of new electrides by computation and high pressure has advanced, revealing that an electride is a stable equilibrium phase of many elements and compounds under high pressure. This review describes the history and current status of electride research and next summarizes the chemical application of electrides and relevant materials. A wide applicability of electride for chemical reactions such

selective hydrogenation and carbon–carbon coupling is shown by extending the concept of electrides.

8. (Highly Cited Paper; 239 Times Cited, Web of Science, Review, 2022-508)

H. Song, S.Q. Luo, H.M. Huang, B.W. Deng, J.H. Ye, *Solar-Driven Hydrogen Production: Recent Advances, Challenges, and Future Perspectives*, *ACS Energy Letters* **7**(3), 1043 (2022).

doi: 10.1021/acsenerylett.1c02591

Brief Description: Solar H₂ production is considered as a potentially promising way to utilize solar energy and tackle climate change stemming from the combustion of fossil fuels. Photocatalytic, photoelectrochemical, photovoltaic–electrochemical, solar thermochemical, photothermal catalytic, and photobiological technologies are the most intensively studied routes for solar H₂ production. We provide a comprehensive review of these technologies. The recent achievements in solar H₂ production are summarized. The challenges and prospects of future research on solar H₂ production technologies are presented.

9. (Highly Cited Paper; 106 Times Cited, Web of Science, Article, 2022-513)

Q. Song, C.A. Occhialini, E. Ergecen, B. Ilyas, D. Amoroso, P. Barone, J. Kapeghian, K. Watanabe, T. Taniguchi, A.S. Botana, S. Picozzi, N. Gedik, R. Comin, *Evidence for a single-layer van der Waals multiferroic*, *Nature* **602**(7898), 601 (2022).

doi: 10.1038/s41586-021-04337-x

Brief Description: Multiferroic materials have attracted wide interest because of their exceptional static and dynamical magnetoelectric properties. Here we report the discovery of type-II multiferroic order in a single atomic layer of the transition-metal-based van der Waals material NiI₂. The evolution of the optical signatures as a function of temperature and layer number surprisingly reveals an ordered magnetic polar state that persists down to the ultrathin limit of monolayer NiI₂. These observations establish NiI₂ and transition metal dihalides as a new platform for studying emergent multiferroic phenomena, chiral magnetic textures and ferroelectricity in the two-dimensional limit.

10. (Highly Cited Paper; 71 Times Cited, Web of Science, Article, 2022-174)

R. Hassandoost, A. Kotb, Z. Movafagh, M. Esmat, R. Guegan, S. Endo, W. Jevasuwan, N. Fukata, Y. Sugahara, A. Khataee, Y. Yamauchi, Y. Ide, E. Doustkhah, *Nanoarchitecturing bimetallic manganese cobaltite spinels for sonocatalytic degradation of oxytetracycline*, *Chemical Engineering Journal* **431**, 133851 (2022).

doi: 10.1016/j.cej.2021.133851

Brief Description: Degradation of contaminants of emerging concern in aqueous media using bimetallic oxides is a promising novel strategy that requires engineering new catalytic routes in bimetallic oxides to perform advanced oxidation; however, several challenges to synthesizing and developing such materials with enhanced, sustainable catalytic features are still being investigated. This study presents the effective use of a manganese cobaltite bimetallic spinel compound for sonocatalysis. We prepared three morphologies of manganese cobaltite for using in the sonocatalytic degradation of oxytetracycline (OTC). The morphology of manganese cobaltite was tuned by changing the amounts of the Mn and Co precursors in the early stage of synthesis.

11. (Highly Cited Paper; 61 Times Cited, Web of Science, Article, 2023-058)

J.Q. Cai, E. Anderson, C. Wang, X.W. Zhang, X.Y. Liu, W. Holtzmann, Y.N. Zhang, F.G. Fan, T. Taniguchi, K. Watanabe, Y. Ran, T. Cao, L. Fu, D. Xiao, W. Yao, X.D. Xu, *Signatures of fractional quantum anomalous Hall states in twisted MoTe₂*, *Nature* **622**(7981), 63 (2023).

doi: 10.1038/s41586-023-06289-w

Brief Description: The interplay between spontaneous symmetry breaking and topology can result in exotic quantum states of matter. A celebrated example is the quantum anomalous Hall (QAH) state, which exhibits an integer quantum Hall effect at zero magnetic field owing to intrinsic ferromagnetism. In the presence of strong electron–electron interactions, fractional QAH (FQAH) states at zero magnetic field can emerge. Here we report experimental signatures of FQAH states in a twisted molybdenum ditelluride (MoTe₂) bilayer. Our findings provide evidence of the long-sought FQAH states, demonstrating MoTe₂ moiré superlattices as a platform for exploring fractional excitations. Our findings provide evidence of the long-sought FQAH states, demonstrating MoTe₂ moiré superlattices as a platform for exploring fractional excitations.

12. (Highly Cited Paper; 18 Times Cited, Web of Science, Article, 2023-355)

A. Loeffler, A. Diaz-Alvarez, R.M. Zhu, N. Ganesh, J.M. Shine, T. Nakayama, Z. Kuncic, *Neuromorphic learning, working memory, and metaplasticity in nanowire networks*, Science Advances **9**(16), eadg3289 (2023).

doi: 10.1126/sciadv.adg3289

Brief Description: Nanowire networks (NWNs) mimic the brain's neurosynaptic connectivity and emergent dynamics. Consequently, NWNs may also emulate the synaptic processes that enable higher-order cognitive functions such as learning and memory. A quintessential cognitive task used to measure human working memory is the n-back task. In this study, task variations inspired by the n-back task are implemented in a NWN device, and external feedback is applied to emulate brain-like supervised and reinforcement learning. NWNs are found to retain information in working memory to at least $n = 7$ steps back, remarkably similar to the originally proposed "seven plus or minus two" rule for human subjects. Simulations elucidate how synapse-like NWN junction plasticity depends on previous synaptic modifications, analogous to "synaptic metaplasticity" in the brain, and how memory is consolidated via strengthening and pruning of synaptic conductance pathways.

13. (Highly Cited Paper; 16 Times Cited, Web of Science, Article, 2023-627)

X. Wang, Z.H. Li, S.X. Wang, K. Sano, Z.F. Sun, Z.H. Shao, A. Takeishi, S. Matsubara, D. Okumura, N. Sakai, T. Sasaki, T. Aida, Y. Ishida, *Mechanical nonreciprocity in a uniform composite material*, Science **380**(6641), 192 (2023).

doi: 10.1126/science.adf1206

Brief Description: Mechanical nonreciprocity, or the asymmetric transmission of mechanical quantities between two points in space, is crucial for developing systems that can guide, damp, and control mechanical energy. We report a uniform composite hydrogel that displays substantial mechanical nonreciprocity, owing to direction-dependent buckling of embedded nanofillers. This material exhibits an elastic modulus more than 60 times higher when sheared in one direction compared with the opposite direction. Consequently, it can transform symmetric vibrations into asymmetric ones that are applicable for mass transport and energy harvest. This material could promote the development of nonreciprocal systems for practical applications such as energy conversion and biological manipulation.

14. (Paper with high Journal Impact Factor; IF2022: 46.2, Web of Science, Review, 2020-149)

H.B. Hu, S.C. Wang, X.L. Feng, M. Pauly, G. Decher, Y. Long, *In-plane aligned assemblies of 1D-nanoobjects: recent approaches and applications*, Chemical Society Reviews **49**(2), 509 (2020).

doi: 10.1039/c9cs00382g

Brief Description: One-dimensional (1D) nanoobjects have strongly anisotropic physical properties which are averaged out and cannot be exploited in disordered systems. The goal of the present

review is to describe the current methods for preparing macroscopic composite films in which the long axis of individual 1D-nanoobjects is more or less parallel to the x,y-plane of the substrate as well as to each other (alignment direction). This review serves a purpose to provide a platform to inspire new alignment approaches with improved assembly quality and upscaling potential and new applications with enhanced performance by alignment.

15. (Paper with high Journal Impact Factor; IF2022: 20.7, Web of Science, Review, 2020-602)
Z.Y. Yang, H.H. Zhang, J.J. Xu, R.Z. Ma, T. Sasaki, Y.J. Zeng, S.C. Ruan, Y.L. Hou, *Anisotropic fluoride nanocrystals modulated by facet-specific passivation and their disordered surfaces*, National Science Review **7**(5), 841 (2020).
doi: 10.1093/nsr/nwaa042
Brief Description: Rutile-type fluorides have been proven to be active components in the context of emerging antiferromagnetic devices. However, controlled synthesis of low-dimensional, in particular two-dimensional (2D), fluorides in a predictable and deterministic manner remains unrealized because of a lack of efficient anisotropic control, which impedes their further development in reduced dimensions. We report here that altered passivation of {110} growing facets can direct the synthesis of rutile-type fluoride nanocrystals into well-defined zero-dimensional (0D) particulates, one-dimensional (1D) rods and 2D sheets in a colloidal approach. The obtained nanocrystals show positive exchange bias and enhanced magnetic transition temperature from the coexistence of long-range antiferromagnetic order and disordered surface spins, making them strong alternatives for flexible magnetic devices and sensors.

16. (Paper with high Journal Impact Factor; IF2022: 41.2, Web of Science, Article, 2021-233)
N. Kasuya, J. Tsurumi, T. Okamoto, S. Watanabe, J. Takeya, *Two-dimensional hole gas in organic semiconductors*, Nature Materials **20**(10), 1401 (2021).
doi: 10.1038/s41563-021-01074-4
Brief Description: A highly conductive metallic gas that is quantum mechanically confined at a solid-state interface is an ideal platform to explore non-trivial electronic states that are otherwise inaccessible in bulk materials. Here we report the observation of a two-dimensional hole gas in solution-processed organic semiconductors in conjunction with an electric double layer using ionic liquids. The measured degenerate holes in the organic semiconductors provide an opportunity to tailor low-dimensional electronic states using molecularly engineered heterointerfaces.

17. (Paper with high Journal Impact Factor; IF2022: 62.1, Web of Science, Review, 2022-413)
O.N. Oliveira, L. Caseli, K. Ariga, *The Past and the Future of Langmuir and Langmuir-Blodgett Films*, Chemical Reviews **122**(6), 6459 (2022).
doi: 10.1021/acs.chemrev.1c00754
Brief Description: The Langmuir–Blodgett (LB) technique, through which monolayers are transferred from the air/water interface onto a solid substrate, was the first method to allow for the controlled assembly of organic molecules. This paper provides an overview of the history of Langmuir monolayers and LB films, including the potential use in devices and a discussion on why LB films are seldom considered for practical applications today. The most promising topics for the short- and long-term prospects of the LB technique are also highlighted.

18. (Paper with high Journal Impact Factor; IF2022: 34.3, Web of Science, Article, 2022-471)
Y. Sasama, T. Kageura, M. Imura, K. Watanabe, T. Taniguchi, T. Uchihashi, Y. Takahide, *High-mobility p-channel wide-bandgap transistors based on hydrogen-terminated diamond/hexagonal boron nitride heterostructures*, Nature Electronics **5**(1), 37 (2022).

doi: 10.1038/s41928-021-00689-4

Brief Description: Field-effect transistors made of wide-bandgap semiconductors can operate at high voltages, temperatures and frequencies with low energy losses, and are important for power and high-frequency electronics. We show that p-channel wide-bandgap heterojunction field-effect transistors can be created, without surface transfer doping, using a hydrogen-terminated diamond channel and hexagonal boron nitride gate insulator. Despite having a reduced density of surface acceptors, the transistors have a low sheet resistance and large ON current compared with other p-channel wide-bandgap transistors, due to a high room-temperature Hall mobility. The transistors also exhibit normally OFF behaviour with an ON/OFF ratio of 108.

19. (Paper with high Journal Impact Factor; IF2022: 64.8, Web of Science, Article, 2023-234)

M. Ishii, Y. Yamashita, S. Watanabe, K. Ariga, J. Takeya, *Doping of molecular semiconductors through proton-coupled electron transfer*, Nature **622**(7982) 285 (2023).

doi: 10.1038/s41586-023-06504-8

Brief Description: We focused on proton-coupled electron-transfer (PCET) reactions, which are widely used in biochemical processes; their redox potentials depend on an easily handled parameter, that is, proton activity. A reference-electrode-free, resistive pH sensor based on this method is proposed. A connection between semiconductor doping and proton activity, a widely used parameter in chemical and biochemical processes, may help create a platform for ambient semiconductor processes and biomolecular electronics.

20. (Paper with high Journal Impact Factor; IF2022: 29.4, Web of Science, Article, 2023-572)

M. Tenjimbayashi, S. Yamamoto, K. Uto, *Production of small powder-stabilized droplets using superhydrophobic mesh*, Advanced Materials **35**(30), 2300486 (2023).

doi: 10.1002/adma.202300486

Brief Description: Cell-picking technology is essential for cell culturing. In this work, a dry powder that encapsulates single to several cells with a >95% aqueous culture medium, thereby acting as a powerful cell-picking tool, is reported. The proposed “drycells” are formed by spraying a cell suspension onto a powder bed of hydrophobic fumed silica nanoparticles. Various handling techniques, such as splitting coalescence and inner liquid replacement, can be used. It is believed that the application of the proposed drycells will greatly improve the accessibility and productivity of single-cell analysis.

2. Major Invited Lectures, Plenary Addresses (etc.)

*List up to 10 main presentations made between FY 2020 and FY 2023 in order from most recent.

*For each, write the date(s), lecturer/presenter's name, presentation title and conference name.

Date(s)	Lecturer/Presenter's name	Presentation title	Conference name
2023 Sep 17-21	<u>Takao Mori</u> (Deputy Director)	Development of enhanced thermoelectric materials and viable devices (Plenary Lecture)	19 th European Conference on Thermoelectrics (ECT2023), Pardubice, Czech Republic
2023 Jul 18-21	<u>Xiao Hu</u> (Group Leader)	Harness light with spinor wavefunction (Invited Lecture)	The 13th International Conference on Metamaterials, Photonic Crystals and Plasmonics (META 2023), Paris, France
2023 Jun 26-30	<u>Tsuyoshi Miyazaki</u> (Group Leader)	Structure Modeling of Complex Nanostructures using Large-Scale DFT and Machine-learning Methods (Invited Lecture)	International Conference on Materials for Advanced Technologies (ICMAT2023), Singapore
2023 Mar 5-10	<u>Takashi Taniguchi</u> (Director)	Synthesis of boron nitride single crystals under high pressure and impurity/isotope control for their functionalization (Invited Lecture)	(American Physical Society) APS March Meeting 2023, Las Vegas, USA
2023 Jan 31 – Feb 3	<u>Kazuhito Tsukagoshi</u> (Group Leader)	Electromechanical Switching of C60 film for the nanoscale memory (Invited Lecture)	1st International Symposium on Carbon Materials (2023 ISCM-1), Tainan, Taiwan
2022 Sep 26-29	<u>Naoki Fukata</u> (MANA PI)	Functionalization of Group IV Semiconductor Nanowire Channels for High-Speed Transistor Applications (Invited Lecture)	International Conference on Solid State Devices and Materials (SSDM 2022), Makuhari Messe, Japan
2022 Aug 29-31	<u>David Bowler</u> (Satellite PI)	Large scale and linear scaling DFT (Plenary Talk)	19th International Conference on "Density Functional Theory", Brussels, Belgium
2022 Jul 3-8	<u>Christian Joachim</u> (Satellite PI)	Quantum Hamiltonian single molecule logic gate (Invited Lecture)	International Conference on Nanotechnology (KK-Nano 2022), Krakow, Poland

2022 May 23-25	<u>Kazuya Terabe</u> (MANA PI)	Nanoionics devices enabling various performance, such as neuromorphic functions (Invited Lecture)	The 2022 MRS Spring Meeting & Exhibit, Hawaii, USA
2021 Dec 13-16	<u>Renzhi Ma</u> (Group Leader)	Soft-chemical synthesis, hetero-assembly, and emergent properties of 2D functional nanosheets (Invited Lecture)	14th Pacific Rim Conference on Ceramic and Glass Technology (PACRIM 14), Vancouver, Canada

3. Major Awards

*List main awards received between FY 2020 and FY 2023 in order from the most recent (within 10 awards).

*For each, write the date issued, recipient's name and the name of award. In case of multiple recipients, underline those affiliated with the Center.

Date	Recipient's name	Name of award
2023 March	<u>Hideo Hosono</u> (Team Leader)	Karl Ferdinand Braun Prize 2023 (issued by The Society for Information Display)
2023 March	<u>Takashi Taniguchi</u> (Director)	James C. McGroddy Prize 2023 for New Materials (issued by the American Physical Society, USA)
2023 March	<u>Tadaaki Nagao</u> (Group Leader), <u>Satoshi Ishii</u> (Team Leader)	The Ichimura Prize 2023 in Science Against Global Warming (issued by Ichimura Foundation for New Technology, Japan)
2022 October	<u>Jinhua Ye</u> (MANA PI)	2022 Pioneers in Energy Research (PIERs) Award (issued by the scientific journal "Energy & Fuels", American Chemical Society, USA)
2022 September	<u>Kenta Yokota</u> (NIMS Junior Researcher, MANA)	CANON ANELVA Student Prize 2022 (issued at the 22nd International Vacuum Congress, IVC22, Sapporo, Japan)
2021 December	<u>Katsuhiko Ariga</u> (MANA PI)	CSJ Award 2021 (issued by the Chemical Society of Japan)
2021 April	<u>Satoshi Ishii</u> (Principal Researcher), <u>Satoshi Tominaka</u> , (Principal Researcher)	The Young Scientists' Award 2021 (issued by the Minister of Education, Culture, Sports, Science and Technology, MEXT, Japan)
2020 October	<u>Akihiro Okamoto</u> (Independent Scientist)	Catalyst Award 2020 at Healthy Longevity Global Grand Challenge, HLGC (issued by the U.S. National Academy of Medicine, NAM, USA)
2020 September	<u>Kazuya Terabe</u> (MANA PI), <u>Tomonobu Nakayama</u> (MANA PI), <u>Masakazu Aono</u> (MANA Executive Advisor, Former MANA Director)	SSDM Award 2020 @ the International Conference on Solid State Devices and Materials (sponsored by the Japan Society of Applied Physics, Japan)
2020 September	<u>Kazuya Terabe</u> (MANA PI)	JSAP Fellow 2020 (issued by The Japan Society of Applied Physics, Japan)

Appendix 2 FY 2023 List of Principal Investigators

NOTE:

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

*Indicate newly added researchers for FY 2020-2023 in the "Notes" column.

		<Principal Investigators at the end of FY 2023>					Principal Investigators Total: 7
Name	Age	Affiliation (Position title, department, organization)	Academic degree, Specialty	Effort (%)*	Starting date of participation	Status of participation (Describe in concrete terms)	Note
<u>Christian Joachim</u>	66	Professor, CEMES, Centre National de la Recherche Scientifique (CNRS)	Ph.D. in Applied Mathematics, Ph.D. in Quantum Physics, Molecular Device Engineering	10	10/1/2007	joins from CNRS satellite	
<u>David R. Bowler</u>	53	Professor, Department of Physics & Astronomy, University College London	Ph.D., University of Oxford, 1997, Large-scale Order-N DFT Calculations	10	API: 4/1/2013 PI: 4/1/2016	joins from UCL satellite	
<u>Thomas E. Mallouk</u>	69	Professor, Department of Chemistry, University of Pennsylvania	Ph.D. in Chemistry, University of California, Berkeley, 1983, Nanoscale Chemistry	0	10/5/2018	-	
<u>Gero Decher</u>	67	Professor, the Faculty of Chemistry, University of Strasbourg	Ph.D., Johannes Gutenberg University Mainz, 1986, Fuzzy Assembly	0	2/1/2019	-	

<u>Dmitri Golberg</u>	63	Professor, Faculty of Science, Queensland University of Technology	Ph.D. Moscow Institute for Ferrous Metallurgy, 1990, Nanotubes and nanowires	10	PI: 10/1/2007 Satellite PI: 4/1/2021	joins from QUT satellite	
<u>Jinhua Ye</u>	61	Professor, College of Physics Science and Technology, Hebei University	Ph.D., The University of Tokyo, 1990, Photocatalyst, Eco-materials	5	10/1/2007- 9/30/2023 (PI: 10/1/2007- 3/31/2023 Satellite PI: 4/1/2023-3/31- 2024)	usually stays in Japan, visiting MANA/NIMS often	
<u>Yusuke Yamauchi</u>	43	Professor, Australian Institute for Bioengineering and Nanotechnology (AIBN), The University of Queensland	Ph.D. in Engineering, Waseda University, 2007, Inorganic Synthetic Chemistry, Inorganic Materials Chemistry	10	Independent Scientist: 10/1/2007 PI: 4/1/2016- 3/31/2023 Satellite PI: 4/1/2023	joins from QUT satellite	

*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
Francoise M. Winnik	Passed Away	4/1/2011-2/13/2021
Zhong Lin Wang	Professor, School of Materials Science and Engineering, Georgia Institute of Technology	10/1/2007 - 3/31/2022
Deputy Director/ Administrative Director Tomonobu Nakayama	Director, Global Networking Division, National Institute for Materials Science (NIMS)	10/1/2008- 3/31/2022 (Except: 5/1/2015- 3/31/2017)
James K. Gimzewski	Distinguished Professor, Chemistry & Biochemistry Department, UCLA	10/1/2007 - 3/31/2023
Yoshitaka Tateyama	Director, Research Center for Energy and Environmental Materials (GREEN), NIMS	10/1/2007-3/31/2023 (Independent Scientist: 10/1/2007 ~ PI: 7/19/2016 ~)
Jinhua Ye	Professor, College of Physics Science and Technology, Hebei University	10/1/2007-9/30/2023 (PI: 10/1/2007-3/31/2023 Satellite PI: 4/1/2023- 3/31/2024)
Gero Decher	Professor Emeritus, University of Strasbourg	2/1/2019 - 3/31/2024

Field Director/Deputy Director Takao Mori	Field Director/Deputy Director/Group Leader, Research Center for Materials Nanoarchitectonics (MANA) , National Institute for Materials Science (NIMS)	MANA Scientist: 10/1/2008 PI: 4/1/2016-3/31/2024 (Due to reorganization)
Field Director/Deputy Director Naoki Fukata	Field Director/Deputy Director/Group Leader, Research Center for Materials Nanoarchitectonics (MANA) , National Institute for Materials Science (NIMS)	Independent Scientist: 10/1/2007 PI: 4/1/2018-3/31/2024 (Due to reorganization)
Takayoshi Sasaki	Group Leader, Research Center for Materials Nanoarchitectonics (MANA) , National Institute for Materials Science (NIMS)	10/1/2007-3/31/2024 (Due to reorganization)
Katsuhiko Ariga	Group Leader, Research Center for Materials Nanoarchitectonics (MANA) , National Institute for Materials Science (NIMS)	10/1/2007-3/31/2024 (Due to reorganization)
Junichi Takeya	Professor, Department of Advanced Materials Science, Graduate School of Frontier Sciences, The University of Tokyo	4/1/2017-3/31/2024 (Due to reorganization)
Kazuya Terabe	Group Leader, Research Center for Materials Nanoarchitectonics (MANA) , National Institute for Materials Science (NIMS)	MANA Scientist: 10/1/2008 PI: 4/1/2016-3/31/2024 (Due to reorganization)
Kazuhito Tsukagoshi	Group Leader, Research Center for Materials Nanoarchitectonics (MANA) , National Institute for Materials Science (NIMS)	1/1/2009-3/31/2024 (Due to reorganization)
Xiao Hu	Group Leader, Research Center for Materials Nanoarchitectonics (MANA) , National Institute for Materials Science (NIMS)	10/1/2007-3/31/2024 (Due to reorganization)

Yoshihiko Takano	Group Leader, Research Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS)	4/1/2016-3/31/2024 (Due to reorganization)
Tadaaki Nagao	Group Leader, Research Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS)	Independent Scientist: 10/1/2007 PI: 4/1/2017-3/31/2024 (Due to reorganization)
Tsuyoshi Miyazaki	Group Leader, Research Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS)	4/1/2016-3/31/2024 (Due to reorganization)

Appendix 3-1 Record of Center Activities (FY 2020-FY 2023)

1. Researchers and Center Staffs, Satellites, Partner Institutions

1-1. Researchers and Center Staffs Participated in the Center's Activities

- Enter the number of researchers and center staffs affiliated with the Center in the table in Appendix 3-1a.

Special mention

- Describe the Center's concrete plans for the future and already-established schedules for employing researchers, particularly principal investigators.
- As background to how the Center is working on the global circulation of world's best brains, give good examples, if any, of how career paths are being established for the Center's researchers; that is, from which top-world research institutions do researchers come to the Center and to which research institutions do the Center's researchers go, and how long are their stays at those institutions.
- In Appendix 3-1b, describe the positions that postdoctoral researchers acquire upon leaving the Center.

The human resources development office of NIMS will take the lead in planning the recruitment of researchers. MANA is prioritizing research areas that will be a focus in the future, while taking into account the wishes of each group within MANA, and is working to secure recruitment slots.

1-2. Satellites and Partner Institutions

- List the satellite and partner institutions, both domestic and overseas, in the table below.
- Indicate newly added and deleted institutions in the "Notes" column.

<Satellite institutions>

Institution name	Principal Investigator(s), if any	Notes
University of California Los Angeles (USA)	James K. Gimzewski (MANA Satellite PI)	Finished (until March 2023)
The National Center for Scientific Research, Toulouse (France)	Christian Joachim (MANA Satellite PI)	
Georgia Institute of Technology (USA)	Zhong Lin Wang (MANA Satellite PI)	Finished (until March 2022)
University of Helsinki (Finland)	Francoise M. Winnik (MANA Satellite PI)	Finished (until Feb. 2021)
University College London (UK)	David R. Bowler (MANA Satellite PI)	
University of Strasbourg (France)	Gero Decher (MANA Satellite PI)	Finished (until March 2024)
University of Pennsylvania (USA)	Thomas E. Mallouk (MANA Satellite PI)	
Queensland University of Technology (Australia)	Dmitri Golberg (MANA Satellite PI)	New (since April 2021)
Hebei University (China)	Jinhua Ye (MANA Satellite PI)	New (since April 2023) Finished (Until March 2024)
The University of Queensland (Australia)	Yusuke Yamauchi (MANA Satellite PI)	New (since April 2023)

< Partner institutions>

Connected to MANA with a valid Memorandum of Understanding (MOU). All MOUs were signed by one of the MANA Directors, Masakazu Aono (until FY2016), Takayoshi Sasaki (FY2017 - FY2020) or Takashi

Taniguchi (since FY2021). * Researchers who left MANA.

Institution name	Principal Investigator(s), if any	Notes
Chongqing University of Science & Technology (CQUST), China	Participating Researchers from MANA: · Masakazu Aono (PI, MANA Director) * · Kazuya Terabe (PI, Group Leader) · Minoru Osada (Visiting Researcher)	MOU: · signed on May 15, 2015 · valid until May 15, 2020
Paul Drude Institute for Solid State Electronics (PDI), Germany	Participating Researchers from MANA: · Masakazu Aono (PI, MANA Director) * · Toyohiro Chikyow (PI, Group Leader) * · Takahiro Nagata (Group Leader) * · Yoshiyuki Yamashita (Researcher) *	MOU: · signed on May 29, 2015 · valid until May 29, 2020
National Cheng Kung University (CKU), Taiwan	Participating Researchers from MANA: · Masakazu Aono (PI, MANA Director) * · Takayoshi Sasaki (PI, Group Leader) * · Minoru Osada (Visiting Researcher)	MOU: · signed on May 30, 2015 · valid until May 30, 2020
University of Washington (UW), USA	Participating Researchers from MANA: · Masakazu Aono (PI, MANA Director) * · Guoping Chen (Group Leader) * · Mitsuhiro Ebara (Group Leader) *	MOU: · signed on Sep 15, 2015 · valid until Sep 15, 2020
University of Science and Technology of Hanoi (USTH), Vietnam	Participating Researchers from MANA: · Masakazu Aono (PI, MANA Director) * · Katsuhiko Ariga (PI, Group Leader) · Huynh T. Ngo (ICYS-MANA Researcher) *	MOU: · signed on Sep 24, 2015 · valid until Sep 24, 2020
University of Wollongong (UOW), Australia	Participating Researchers from MANA: · Yoshio Bando (Chief Operating Officer) * · Yusuke Yamauchi (Satellite PI)	MOU: · signed on Sep 29, 2015 · valid until Sep 29, 2020
University of Chemistry and Technology (UCT), Czech Republic	Participating Researchers from MANA: · Masakazu Aono (PI, MANA Director) *	MOU: · signed on Jan 18, 2016 · valid until Jan 18, 2021
University of Messina, Italy	Participating Researchers from MANA: · Masakazu Aono (PI, MANA Director) * · Katsuhiko Ariga (PI, Group Leader) · Jonathan P. Hill (PI, Group Leader) · Huynh T. Ngo (ICYS-MANA Researcher) *	MOU: · signed on Jun 30, 2016 · valid until Jun 30, 2021
MacDiarmid Institute for Advanced Materials and Nanotechnology, New Zealand	Participating Researchers from MANA: · Masakazu Aono (PI, MANA Director) * · Tomonobu Nakayama (PI, Deputy Director) * · Tadaaki Nagao (PI, Group Leader)	MOU: · signed on Aug 18, 2016 · valid until Aug 18, 2021
Korea Institute of Science and Technology (KIST), Korea	Participating Researchers from MANA: · Masakazu Aono (PI, MANA Director) * · Minoru Osada (Visiting Researcher)	MOU: · signed on Sep 21, 2016 · valid until Sep 21, 2021
Queensland University of Technology (QUT), Australia	Participating Researchers from MANA: · Yoshio Bando (Chief Operating Officer) * · Dmitri Golberg (Satellite PI)	MOU (Replaced): · signed on Nov 25, 2016 · valid until Sep 2, 2021
Saigon High Tech Park (SHTP Labs), Vietnam	Participating Researchers from MANA: · Masakazu Aono (PI, MANA Director) * · Toyohiro Chikyow (PI, Group Leder) * · Jin Kawakita (Researcher) *	MOU: · signed on Oct 17, 2016 · valid until Oct 17, 2021
London Centre for Nanotechnology (LCN), University College	Participating Researchers from MANA: · Takayoshi Sasaki (PI, MANA Director) · Tsuyoshi Miyazaki (PI, Group Leader)	MOU: · signed on Nov 13, 2017 · valid until Nov 13, 2022

London (UCL), UK		
Institute of Science and Technology (SUT), Thailand	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Naoki Fukata (PI, Group Leader) • Wipakorn Jevasuwan (Researcher)	MOU: • signed on Jan 30, 2018 • valid until Jan 30, 2023
Institute of Electronics (IE) at the Bulgarian Academy of Sciences (BAS), Bulgaria	Participating Researchers from MANA: • Takayoshi Sasaki (PI, Group Leader) • Naoki Fukata (PI, Group Leader) • Wipakorn Jevasuwan (Researcher) • Ryo Matsumura (Researcher)	MOU: • signed on Jan 31, 2018 • valid until Jan 31, 2023
Korea Basic Science Institute (KBSI), Busan Center, Korea	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Yutaka Wakayama (GL, Admin Director) • Shu Nakaharai (Researcher) • Shinsuke Ishihara (Researcher)	MOU: • signed on Feb 22, 2018 • valid until Feb 22, 2023
SASTRA Deemed University, Thanjavur, India	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Takashi Nakanishi (Group Leader) • Kentaro Tashiro (Researcher) *	MOU: • signed on Mar 28, 2018 • valid until Mar 28, 2023
Federal University of Rio de Janeiro (UFRJ), Brazil	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Yoshihiko Takano (PI, Group Leader) • Hiroyuki Takeya (Researcher) *	MOU: • signed on Apr 27, 2018 • valid until Apr 27, 2023
Department of Chemistry, University of Helsinki, Finland	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Naoto Shirahata (Group Leader) • Jun Nakanishi (Group Leader) *	MOU: • signed on Jun 23, 2018 • valid until Jun 23, 2023
Department of Civil and Environmental Engineering, Stanford University, USA	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Akihiro Okamoto (Group Leader) *	MOU: • signed on Jul 9, 2018 • valid until Jul 9, 2023
The Pennsylvania State University, USA (MANA Satellite)	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Tomonobu Nakayama (PI, Deputy Director) *	MOU: • signed on Oct 5, 2018 • valid until Oct 5, 2023
The University of Queensland, Australia	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director)	MOU: • signed on Oct 9, 2018 • valid until Oct 9, 2023
Centre National de la Recherche Scientifique (CEMES-CNRS), Toulouse, France (MANA Satellite)	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Tomonobu Nakayama (PI, Deputy Director) * • Makoto Sakurai (Researcher) • Ayako Nakata (Researcher)	MOU (Renewal): • signed on Dec 21, 2018 • valid until Dec 21, 2023
Research Center for Sustainable Energy and Nanotechnology (RCSEN), National Chung Hsing University, Taiwan	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Katsuhiko Ariga (PI, Group Leader) • Naoki Fukata (PI, Group Leader) • Genki Yoshikawa (Group Leader) *	MOU: • signed on Dec 26, 2018 • valid until Dec 26, 2023
University of Strasbourg, CNRS, France (MANA Satellite)	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Katsuhiko Ariga (PI, Group Leader)	MOU: • signed on Jan 21, 2019 • valid until Jan 21, 2024

	• Tadaaki Nagao (PI, Group Leader) • Renzhi Ma (Group Leader)	
The Commonwealth Scientific and Industrial Research organisation (CSIRO), Australia	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director)	MOU: • signed on Mar 19, 2019 • valid until Mar 19, 2024
Qatar Environmental & Energy Research Institute (QEERI), Qatar	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Yutaka Wakayama (GL, Admin Director) • Ryoma Hayakawa (Researcher)	MOU: • signed on May 8, 2019 • valid until May 8, 2024
University of Naples Federico II, Italy	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director)	MOU: • signed on Jun 13, 2019 • valid until Jun 13, 2024
College of Science, National Chiao Tung University (NCTU), Taiwan	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Kazuhito Tsukagoshi (PI, Group Leader) • Tomonobu Nakayama (PI, Deputy Director) * • Ryuichi Arafune (Researcher)	MOU: • signed on Jul 2, 2019 • valid until Jul 2, 2024
Catalan Institute of Nanoscience and Nanotechnology (ICN2), Barcelona, Spain	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Tomonobu Nakayama (PI, Deputy Director) *	MOU: • signed on Oct 16, 2019 • valid until Oct 16, 2024
Hierarchical Green-Energy Materials Research Center (HiGEM), National Cheng Kung University (NCKU), Taipei, Taiwan	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Takahiro Nagata (Group Leader) * • Jun Chen (Researcher) * • Shinjiro Yagyu (Researcher) *	MOU: • signed on Oct 30, 2019 • valid until Oct 30, 2024
Sydney Nano Institute, University of Sydney, Australia	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Tomonobu Nakayama (PI, Deputy Director) * • Jun Nakanishi (Group Leader) *	MOU: • signed on Nov 12, 2019 • valid until Nov 12, 2024
Nepal Academy of Science and Technology (NAST), Katmandu, Nepal	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Katsuhiko Ariga (PI, Group Leader) • Lok Kumar Shrestha (Researcher)	MOU: • signed on Dec 16, 2019 • valid until Dec 16, 2024
Faculty of Chemical Technology, Pardubice University, Czech Republic	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Jonathan Hill (PI, Group Leader) • Jan Labuta (Researcher)	MOU: • signed on Dec 18, 2019 • valid until Dec 18, 2024
Department of Applied physics and School of Pharmacy, University of Eastern Finland, Kuopio, Finland	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Kohsaku Kawakami (Group Leader) *	MOU: • signed on Jan 13, 2020 • valid until Jan 13, 2025
Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Jonathan Hill (PI, Group Leader) • Jan Labuta (Researcher)	MOU: • signed on Feb 3, 2020 • valid until Feb 3, 2025
University of Pennsylvania, USA (MANA Satellite)	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director)	MOU: • signed on Jun 22, 2020 • valid until Jun 22, 2025

Centre for Clean Energy Technology, University of Technology Sydney (UTS), Australia	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Renzhi Ma (Group Leader)	MOU: • signed on Aug 13, 2020 • valid until Aug 13, 2025
Institute of Macromolecular Chemistry (IMC), Czech Academy of Sciences (CAS), Czech Republic	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Jonathan Hill (PI, Group Leader) • Jan Labuta (Researcher)	MOU: • signed on Oct 9, 2020 • valid until Oct 9, 2025
University of Chemistry and Technology (UCT), Prague, Czech Republic	Participating Researchers from MANA: • Takayoshi Sasaki (PI, MANA Director) • Katsuhiko Ariga (PI, Group Leader) • Jonathan Hill (PI, Group Leader) • Jan Labuta (Researcher)	MOU: • signed on Mar 23, 2021 • valid until Mar 23, 2026
Queensland University of Technology (QUT), Brisbane, Australia	Participating Researchers from MANA: • Takashi Taniguchi (MANA Director) • Tomonobu Nakayama (PI, Deputy Director) *	MOU (Replacement): • signed on Sep 2, 2021 • valid until Jun 30, 2026
Comenius University in Bratislava, Slovak Republic	Participating Researchers from MANA: • Takashi Taniguchi (MANA Director) • Jonathan Hill (PI, Group Leader) • Jan Labuta (Researcher) • Shinsuke Ishihara (Researcher)	MOU: • signed on Aug 10, 2022 • valid until Aug 10, 2027
London Centre for Nanotechnology (LCN), University College London (UCL), UK	Participating Researchers from MANA: • Takashi Taniguchi (MANA Director) • Tsuyoshi Miyazaki (PI, Group Leader) • Ayako Nakata (Researcher)	MOU (Renewal): • signed on Jan 19, 2023 • valid until Jan 19, 2028
iCAST, National Chung Hsing University (NCHU), Taiwan	Participating Researchers from MANA: • Takashi Taniguchi (MANA Director) • Yutaka Wakayama (GL, Admin Director) • Katsuhiko Ariga (PI, Group Leader) • Kazuhito Tsukagoshi (PI, Group Leader) • Naoki Fukata (PI, Group Leader)	MOU: • signed on Jan 31, 2024 • valid until Jan 31, 2029

2. Status of Collaboration with Overseas Satellites

2-1. Coauthored Papers

- List the refereed papers published between FY 2020 and FY 2023 that were coauthored between the Center's researcher(s) in domestic institution(s) (include satellite institutions) and overseas satellite institution(s). List them by overseas satellite institution in the below blocks.
- Transcribe data in same format as in Appendix 1. Italicize the names of authors affiliated with overseas satellite institutions.

Overseas Satellite 1; University of California Los Angeles, USA; PI: James K. Gimzewski, until FY2022 (Total: 2 papers)

- 1) (2020-A306) R.M. Zhu, J. Hochstetter, A. Loeffler, A. Diaz-Alvarez, *A. Stieg, J. Gimzewski*, T. Nakayama, Z. Kuncic, Harnessing adaptive dynamics in neuro-memristive nanowire networks for transfer learning, IEEE International Conference on Rebooting Computing, 102 (2020). doi: 10.1109/ICRC2020.2020.00007
- 2) (2023-195) R. Higuchi, S. Lilak, H.O. Sillin, T. Tsuruoka, M. Kunitake, T. Nakayama, *J.K. Gimzewski*, A.Z. Stieg, Metal doped polyaniline as neuromorphic circuit elements for in-materia computing, Science and Technology of Advanced Materials **24**(1), 2178815 (2023). doi: 10.1080/14686996.2023.2178815

Overseas Satellite 2; The National Center for Scientific Research, Toulouse, France; PI: Christian Joachim (Total: 4 papers)

- 1) (2020-426) M. Sakurai, S. Nagano, *C. Joachim*, Local heat generated by a focused He⁺ ion beam, Nanotechnology **31**(34), 345708 (2020). doi: 10.1088/1361-6528/ab91f3
- 2) (2021-395) W. Nakanishi, A. Nakata, P. Perez, M. Takeuchi, *C. Joachim*, K. Sagisaka, The Emergence of Multiple Coordination Numbers in Gold-Cyanoarene Complexes: A Study of the On-Surface Coordination Mechanism, Journal of Physical Chemistry C **125**(18), 9937 (2021). doi: 10.1021/acs.jpcc.1c02456
- 3) (2023-486) M. Sakurai, S. Nagano, *C. Joachim*, Direct milling of 25 nm in diameter gold and graphene nanogears by a focused He⁺ ion beam, Vacuum **207**, 111605 (2023). doi: 10.1016/j.vacuum.2022.111605
- 4) (2023-487) M. Sakurai, T. Ueta, *C. Joachim*, Weakly Interacting Molecular Spins in On-Surface Synthesized Nanoclusters on a Graphene Oxide Nanosheet, Advanced Electronic Materials **9**(10), 2300347 (2023). doi: 10.1002/aelm.202300347

Overseas Satellite 3; Georgia Institute of Technology, USA; PI: Zhong Lin Wang, until FY2021 (Total: 0 papers)

Overseas Satellite 4; University of Helsinki, Finland; PI: Françoise M. Winnik, until FY2020 (Total: 5 papers)

- 1) (2020-363) J. Niskanen, I. Zhang, Y. Xue, D. Golberg, D. Maysinger, *F.M. Winnik*, Dually-functionalized boron nitride nanotubes to target glioblastoma multiforme, Materials Today Chemistry **16**, 100270 (2020). doi: 10.1016/j.mtchem.2020.100270
- 2) (2021-391) U. Nagarajan, G. Beaune, A.Y.W. Lam, D. Gonzalez-Rodriguez, *F.M. Winnik*, F. Brochard-Wyart, Inert-living matter, when cells and beads play together, Communications Physics **4**, 2 (2021). doi: 10.1038/s42005-020-00506-y
- 3) (2022-406) J. Niskanen, Y.M. Xue, D. Golberg, *F.M. Winnik*, C. Pellerin, J. Vapaavuori, Probing interfacial interactions and dynamics of polymers enclosed in boron nitride nanotubes, Journal of Polymer Science **60**(2), 233 (2022). doi: 10.1002/pol.20210620
- 4) (2022-593) N. Velychkivska, O. Sedlacek, A.B. Shatan, M. Spasovova, S.K. Filippov, M.K. Chahal, L. Janisova, J. Brus, L. Hanykova, J.P. Hill, *F.M. Winnik*, J. Labuta, Phase Separation and pH-Dependent Behavior of Four-Arm Star-Shaped Porphyrin-PNIPAM₄ Conjugates, Macromolecules **55**(6), 2109 (2022). doi: 10.1021/acs.macromol.1c02188
- 5) (2023-402) U. Nagarajan, S. Chandra, T. Yamazaki, N. Shirahata, *F.M. Winnik*, Analysis of Silicon Quantum Dots and Serum Proteins Interactions Using Asymmetrical Flow Field-Flow Fractionation, Langmuir **39**(22), 7557 (2023). doi: 10.1021/acs.langmuir.3c00109

Overseas Satellite 5; University College London, UK; PI: David Bowler (Total: 6 papers)

- 1) (2020-032) J.S. Baker, T. Miyazaki, *D.R. Bowler*, The pseudoatomic orbital basis: electronic accuracy

and soft-mode distortions in ABO₃ perovskites, *Electronic Structure* **2**(2), 025002 (2020). doi: 10.1088/2516-1075/ab950e

2) (2020-136) T. Hirakawa, *D.R. Bowler*, T. Miyazaki, Y. Morikawa, L.A. Truflandier, Blue moon ensemble simulation of aquation free energy profiles applied to mono and bifunctional platinum anticancer drugs, *Journal of Computational Chemistry* **41**(22), 1973 (2020). doi: 10.1002/jcc.26367

3) (2020-343) A. Nakata, J.S. Baker, S.Y. Mujahed, J.T.L. Poulton, S. Arapan, J.B. Lin, Z. Raza, S. Yadav, L. Truflandier, T. Miyazaki, *D.R. Bowler*, Large scale and linear scaling DFT with the CONQUEST code, *Journal of Chemical Physics* **152**(16), 164112 (2020). doi: 10.1063/5.0005074

4) (2022-391) A. Nakata, *D.R. Bowler*, T. Miyazaki, Large-Scale DFT Methods for Calculations of Materials with Complex Structures, *Journal of the Physical Society of Japan* **91**(9), 091011 (2022). doi: 10.7566/JPSJ.91.091011

5) (2023-147) V. Gavini, S. Baroni, V. Blum, *D.R. Bowler*, A. Bucchieri, J.R. Chelikowsky, S. Das, W. Dawson, P. Delugas, M. Dogan, C. Draxl, G. Galli, L. Genovese, P. Giannozzi, M. Giantomassi, X. Gonze, M. Govoni, F. Gygi, A. Gulans, J.M. Herbert, S. Kokott, T.D. Kühne, K.H. Liou, T. Miyazaki, P. Motamarri, A. Nakata, J.E. Pask, C. Plessl, L.E. Ratcliff, R.M. Richard, M. Rossi, R. Schade, M. Scheffler, O. Schütt, P. Suryanarayana, M. Torrent, L. Truflandier, T.L. Windus, Q.M. Xu, V.W.Z. Yu, D. Perez, Roadmap on electronic structure codes in the exascale era, *Modelling and Simulation in Materials Science and Engineering* **31**(6), 063301 (2023). doi: 10.1088/1361-651X/acdf06

6) (2023-481) K. Sagisaka, T. Kusawake, *D. Bowler*, S. Ohno, Emergence of metallic surface states and negative differential conductance in thin β -FeSi₂ films on Si(001), *Journal of Physics - Condensed Matter* **35**(13), 135001 (2023). doi: 10.1088/1361-648X/acb628

Overseas Satellite 6; Strasbourg University, France; PI: Gero Decher, until FY2023 (Total: 1 papers)

1) (2022-024) K. Ariga, Y. Lvov, *G. Decher*, There is still plenty of room for layer-by-layer assembly for constructing nanoarchitectonics-based materials and devices, *Physical Chemistry Chemical Physics* **24**(7), 4097 (2022). doi: 10.1039/d1cp04669a

Overseas Satellite 7; University of Pennsylvania, US; PI: Thomas E. Mallouk) (Total: 0 papers)

Overseas Satellite 8; Queensland University of Technology, Australia); PI: Dmitri Golberg (Total: 11 papers)

1) (2021-090) Y.X. Chen, D.M. Tang, Z.W. Huang, X. Liu, J. Chen, T. Sekiguchi, W.Y. Qu, J.X. Chen, D.R. Xu, Y. Bando, X.L. Hu, X.P. Wang, *D. Golberg*, X.F. Tang, Stable single atomic silver wires assembling into a circuitry-connectable nanoarray, *Nature Communications* **12**(1), 1191 (2021). doi: 10.1038/s41467-021-21462-3

2) (2021-211) X.F. Jiang, C.Y. Xu, T. Gao, Y. Bando, *D. Golberg*, P.C. Dai, M. Hu, R.Z. Ma, Z. Hu, X.B. Wang, Flexible conductive polymer composite materials based on strutted graphene foam, *Composites Communications* **25**, 100757 (2021). doi: 10.1016/j.coco.2021.100757

3) (2021-363) L. Meng, L. Zhang, Y.H. Zhu, H.L. Jiang, Y.V. Kaneti, J. Na, Y. Yamauchi, *D. Golberg*, H. Jiang, C.Z. Li, Highly dispersed secondary building unit-stabilized binary metal center on a hierarchical porous carbon matrix for enhanced oxygen evolution reaction, *Nanoscale* **13**(2), 1213 (2021). doi: 10.1039/d0nr05941b

4) (2021-609) Q.H. Weng, L.L. Zeng, Z.W. Chen, Y.X. Han, K. Jiang, Y. Bando, *D. Golberg*, Hydrogen Storage in Carbon and Oxygen Co-Doped Porous Boron Nitrides, *Advanced Functional Materials* **31**(4), 2007381 (2021). doi: 10.1002/adfm.202007381

5) (2021-014) F. Amri, N.L.W. Septiani, L. Ni, M. Rezki, M. Iqbal, Y. Yamauchi, *D. Golberg*, Y.V. Kaneti, B. Yuliarto, Mesoporous TiO₂-based architectures as promising sensing materials towards next-generation biosensing applications, *Journal of Materials Chemistry B* **9**(5), 1189 (2021). doi: 10.1039/d0tb02292f

6) (2022-258) M.J. Kim, J.F.S. Fernando, Z.B. Li, A. Alowasheer, A. Ashok, R.J. Xin, D. Martin, A.K. Nanjundan, *D.V. Golberg*, Y. Yamauchi, N. Admiralian, J.L. Li, Ultra-stable sodium ion storage of biomass porous carbon derived from sugarcane, *Chemical Engineering Journal* **45**, 136344 (2022). doi: 10.1016/j.cej.2022.136344

7) (2022-261) M. Kim, K.L. Firestein, J.F.S. Fernando, X.T. Xu, H. Lim, *D.V. Golberg*, J. Na, J. Kim, H.

Nara, J. Tang, Y. Yamauchi, Strategic design of Fe and N co-doped hierarchically porous carbon as superior ORR catalyst: from the perspective of nanoarchitectonics, *Chemical Science* **13**(36), 10836 (2022). doi: 10.1039/d2sc02726g

8) (2022-387) T. Nagaura, J.L. Li, J. F.S. Fernando, A. Ashok, A. Alowasheer, A.K. Nanjundan, S. Lee, *D.V. Golberg*, J. Na, Y. Yamauchi, Expedition Electrochemical Synthesis of Mesoporous Chalcogenide Flakes: Mesoporous Cu₂Se as a Potential High-Rate Anode for Sodium-Ion Battery, *Small* **18**(34), 2106629 (2022). doi: 10.1002/smll.202106629

9) (2022-406) J. Niskanen, Y.M. Xue, *D. Golberg*, F.M. Winnik, C. Pellerin, J. Vapaavuori, Probing interfacial interactions and dynamics of polymers enclosed in boron nitride nanotubes, *Journal of Polymer Science* **60**(2), 233 (2022). doi: 10.1002/pol.20210620

10) (2022-735) Z.W. Huang, J.X. Liang, D.M. Tang, Y.X. Chen, W.Y. Qu, X.L. Hu, J.X. Chen, Y.Y. Dong, D.R. Xu, *D. Golberg*, J. Li, X.F. Tang, Interplay between remote single-atom active sites triggers speedy catalytic oxidation, *Chem* **8**(11), 3008 (2022). doi: 10.1016/j.chempr.2022.07.002

11) (2022-238) Y.V. Kaneti, D.P. Benu, X.T. Xu, B. Yuliarto, Y. Yamauchi, *D. Golberg*, Borophene: Two-dimensional Boron Monolayer: Synthesis, Properties, and Potential Applications, *Chemical Reviews* **122**(1), 1000 (2022). doi: 10.1021/acs.chemrev.1c00233

Overseas Satellite 9; Hebei University, China; PI: Jinhua Ye, FY2023 (Total: 6 papers)

1) (2023-112) D.W. Deng, H. Song, Q. Wang, J.N. Hong, S. Song, Y.W. Zhang, K. Peng, H.W. Zhang, T. Kako, *J.H. Ye*, Highly efficient and stable photothermal catalytic CO₂ hydrogenation to methanol over Ru/In₂O₃ under atmospheric pressure, *Applied Catalysis B* **327**, 122471 (2023). doi: 10.1016/j.apcatb.2023.122471

2) (2023-214) H. Huang, S.Y. Wang, X.C. fan, D. Philo, L. Fang, W.G. Tu, T. Qiu, Z.G. Zou, *J.H. Ye*, Near-Infrared Plasmon-Driven Nitrogen Photofixation Achieved by Assembling Size-Controllable Gold Nanoparticles on TiO₂ Nanocavity Arrays, *ACS Sustainable Chemistry & Engineering* **11**(30), 10993 (2023). doi: 10.1021/acssuschemeng.2c07086

3) (2023-256) F.Y. Xu, X. Ding, T.K. Kim, H. Chen, J.G. Yu, *J.H. Ye*, S.Y. Wang, Homogeneous–Heterogeneous Hybrid Artificial Photosynthesis Induced by Organic Semiconductors with Controlled Surface Architectures, *Advanced Functional Materials* **33**(34), 2303335 (2023). doi: 10.1002/adfm.202303335

4) (2023-324) S.J. Li, H.W. Lin, G.L. Yang, X.H. Ren, S.Q. Luo, *J.H. Ye*, One-step construction of buried a-Si/c-Si junction photocathodes for boosting photoelectrochemical hydrogen production, *Chemical Engineering Journal* **455**, 140898 (2023). doi: 10.1016/j.cej.2022.140898

5) (2023-329) Y. Li, X. Bai, D. Yuan, C.Y. Yu, X.Y. San, Y. Guo, L.Q. Zhang, *J.H. Ye*, Cu-based high-entropy two-dimensional oxide as stable and active photothermal catalyst, *Nature Communications* **14**, 3171 (2023). doi: 10.1038/s41467-023-38889-5

6) (2023-702) C.C. Zhang, J. Wang, S.S. Ouyang, H. Song, *J.H. Ye*, L. Shi, Cocatalysts in photocatalytic methane conversion: recent achievements and prospects, *Science China Chemistry* **66**(9), 2532 (2023). doi: 10.1007/s11426-023-1737-2

Overseas Satellite 10; The University of Queensland, Australia); PI: Yusuke Yamauchi, since FY2023 (Total: 15 papers)

1) (2023-121) M. Eguchi, M. Han, Y. Asakura, J.P. Hill, J. Henzie, K. Ariga, A.E. Rowan, W. Chaikittisilp, *Y. Yamauchi*, Materials Space-Tectonics: Atomic-level Compositional and Spatial Control Methodologies for Synthesis of Future Materials, *Angewandte Chemie - International Edition* **62**(46), e202307615 (2023). doi: 10.1002/anie.202307615

2) (2023-169) O. Guselnikova, O. Semyonov, E. Sviridova, R. Gulyaev, A. Gorbunova, D. Kogolev, A. Trelin, *Y. Yamauchi*, R. Boukherroub, P. Postnikov, "Functional upcycling" of polymer waste towards the design of new materials, *Chemical Society Reviews* **52**(14), 4755 (2023). doi: 10.1039/d2cs00689h;

3) (2023-251) B. Jiang, Y.N. Guo, F.Y. Sun, S.Y. Wang, Y.Q. Kang, X.T. Xu, J.J. Zhao, J. You, M. Eguchi, *Y. Yamauchi*, H.X. Li, Nanoarchitectonics of Metallene Materials for Electrocatalysis, *ACS Nano* **17**(14), 13017 (2023). doi: 10.1021/acsnano.3c01380

4) (2023-530) Z.Q. Wang, M. An, D.S. Chen, Y.J. Yuan, X.T. Xu, S.W. Sharshir, B. Yuliarto, F.B. Zhu, X.H. Sun, S. Gao, *Y. Yamauchi*, Molecular insights into enhanced water evaporation from a hybrid

- nanostructured surface with hydrophilic and hydrophobic domains, *Chemical Engineering Journal* **465**, 142838 (2023). doi: 10.1016/j.cej.2023.142838
- 5) (2023-566) Y. Tang, C.H. Yang, Y.Y. Xie, Y.Q. Kang, W.X. Que, J. Henzie, *Y. Yamauchi*, Tailored MXene Nanoarchitectonics: MXene with Mesoporous Nitrogen-Doped Carbon Confined Ultrafine Molybdenum Carbide Nanodots for Efficient Electrocatalytic Hydrogen Evolution, *ACS Sustainable Chemistry & Engineering* **11**(1), 168 (2023). doi: 10.1021/acssuschemeng.2c05106
- 6) (2023-579) N.L. Torad, Y. Tsuji, A. Alowasheer, M. Momotake, K. Okazawa, K. Yoshizawa, M. Matsumoto, M. Yamato, *Y. Yamauchi*, M. Eguchi, Extraordinary Acceleration of an Electrophilic Reaction Driven by the Polar Surface of 2D Aluminosilicate Nanosheets, *Small* **19**(11), 2205857 (2023). doi: 10.1002/sml.202205857
- 7) (2023-608) C. Wan, G. Li, J.P. Wang, L.X. Xu, D.G. Cheng, F.Q. Chen, Y. Asakura, Y.Q. Kang, *Y. Yamauchi*, Modulating Electronic Metal-Support Interactions to Boost Visible-Light-Driven Hydrolysis of Ammonia Borane: Nickel-Platinum Nanoparticles Supported on Phosphorus-Doped Titania, *Angewandte Chemie - International Edition* **62**(40), e202305371 (2023). doi: 10.1002/anie.202305371
- 8) (2023-637) F.C. Wei, B.W. Chen, J.W. Fu, Q.G. He, C.B. Jing, J.G. Cheng, M. Eguchi, J. Na, *Y. Yamauchi*, S.H. Liu, A universal strategy for large-scale and controlled fabrication of conductive mesoporous polymer monolayers, *Chemical Engineer Journal* **460**, 141504 (2023). doi: 10.1016/j.cej.2023.141504
- 9) (2023-648) F. Xian, L.L. Jia, Y. Sugahara, *Y. Yamauchi*, T. Sasaki, R.Z. Ma, Achieving high ion flux and asymmetric transport in nanofluidic membranes reconstructed from layered double hydroxide nanosheets, *Chemical Engineering Journal* **471**, 144703 (2023). doi: 10.1016/j.cej.2023.144703
- 10) (2023-654) R.J. Xin, M.J. Kim, P. Cheng, A. Ashok, S. Chowdhury, T. Park, A. Alowasheer, M.S. Hossain, J. Tang, J.W. Yi, *Y. Yamauchi*, Y.V. Kaneti, J. Na, Enlarging the porosity of metal-organic framework-derived carbons for supercapacitor applications by a template-free ethylene glycol etching method, *Journal of Materials Chemistry A* **11**(24), 12759 (2023). doi: 10.1039/d2ta06307g
- 11) (2023-655) Z.Y. Xing, X.X. Xuan, H.Y. Hu, M.H. Li, H.M. Gao, A. Alowasheer, D. Jiang, L.Y. Zhu, Z.Y. Li, Y.Q. Kang, J. Zhang, X.B. Yi, *Y. Yamauchi*, X.T. Xu, Particle size optimization of metal-organic frameworks for superior capacitive deionization in oxygenated saline water, *Chemical Communications* **59**(30), 4515 (2023). doi: 10.1039/d2cc06460j
- 12) (2023-659) X.T. Xu, M. Eguchi, Y. Asakura, L.K. Pan, *Y. Yamauchi*, Metal-organic framework derivatives for promoted capacitive deionization of oxygenated saline water, *Energy & Environmental Science* **16**(5), 1815 (2023). doi: 10.1039/d2ee03530h
- 13) (2023-687) B.Y. Jin, D.Y. Wang, Y. He, J.J. Mao, Y.Q. Kang, C. Wan, W. Xia, J. Kim, M. Eguchi, *Y. Yamauchi*, Composite polymer electrolytes with ionic liquid grafted-Laponite for dendrite-free all-solid-state, *Chemical Science* **14**(29), 7956 (2023). doi: 10.1039/d3sc01647a
- 14) (2023-706) L. Zhang, H.L.H. Chong, P.Y. Moh, M.D. Albaqami, A.M. Tighezza, C.J. Qin, X.Y. Ni, J. Cao, X.T. Xu, *Y. Yamauchi*, β -FeOOH Nanospindles as Chloride-Capturing Electrodes for Electrochemical Faradic Deionization of Saline Water, *Bulletin of the Chemical Society of Japan* **96**(3), 306 (2023). doi: 10.1246/bcsj.20220274
- 15) (2023-724) W.M. Zhou, Z.Q. Wang, H.Q. Huang, Y.T. Wu, A.A. Allothman, M. Ouladsmane, *Y. Yamauchi*, X.T. Xu, M. An, L.W. Wang, Z.H. Yuan, Significant enhancement in hydrogen evolution rate of 2D bismuth oxychloride lamellar membrane photocatalyst with cellulose nanofibers, *Chemical Engineering Journal* **456**, 140933 (2023). doi: 10.1016/j.cej.2022.140933

2-2. Status of Researcher Exchanges

- Using the below tables, indicate the number of researcher exchanges between the Center (include domestic satellite institutions) and overseas satellite institutions during the period of FY 2020-FY 2023. Enter by institution and fiscal year.
- Write the number of principal investigator visits in the upper space and the number of other researcher visits in the lower space.

Overseas Satellite 1: University of California Los Angeles (USA); PI: James K. Gimzewski

<To overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	0	0	-	0

Other researchers	0	0	0	-	0
Total	0	0	0	-	0

<From overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	0	1	-	1
Other researchers	0	0	0	-	0
Total	0	0	0	-	0

Overseas Satellite 2: CNRS-CEMES (France); PI: Christian Joachim

<To overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	0	0	-	0
Other researchers	0	4	0	0	4
Total	0	4	0	0	4

<From overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	0	2	1	3
Other researchers	0	0	0	0	0
Total	0	0	2	1	3

Overseas Satellite 3: Georgia Institute of Technology (USA); PI: Zhong Lin Wang

<To overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	0	-	-	0
Other researchers	0	0	-	-	0
Total	0	0	-	-	0

<From overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	0	-	-	0
Other researchers	0	0	-	-	0
Total	0	0	-	-	0

Overseas Satellite 4: University of Helsinki (Finland); PI: Francoise M. Winnik

<To overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	-	-	-	0

Other researchers	0	-	-	-	0
Total	0	-	-	-	0

<From overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	-	-	-	0
Other researchers	0	-	-	-	0
Total	0	-	-	-	0

Overseas Satellite 5: UCL (UK); PI: David R. Bowler

<To overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	0	2	-	2
Other researchers	0	0	1	3	4
Total	0	0	3	3	6

<From overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	0	1	1	2
Other researchers	0	0	0	0	0
Total	0	0	1	1	2

Overseas Satellite 6: University of Strasbourg (France); PI: Gero Decher

<To overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	0	0	-	0
Other researchers	0	0	0	0	0
Total	0	0	0	0	0

<From overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	0	0	0	0
Other researchers	0	0	0	0	0
Total	0	0	0	0	0

Overseas Satellite 7: University of Pennsylvania (USA); PI: Thomas E. Mallouk

<To overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators		0	0	-	0

Other researchers		0	0	0	0
Total		0	0	0	0

<From overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	0	0	0	0	0
Other researchers	0	0	0	0	0
Total	0	0	0	0	0

Overseas Satellite 8: Queensland University of Technology (Australia); PI: Dmitri Golberg

<To overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	-	0	0	-	0
Other researchers	-	0	0	0	0
Total	-	0	0	0	0

<From overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	-	0	1	1	2
Other researchers	-	0	0	0	0
Total	-	0	1	1	2

Overseas Satellite 9: Hebei University (China); PI: Jinhua Ye

<To overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	-	-	-	-	0
Other researchers	-	-	-	0	0
Total	-	-	-	0	0

<From overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	-	-	-	18	18
Other researchers	-	-	-	0	0
Total	-	-	-	18	18

Overseas Satellite 10: The University of Queensland (Australia); PI: Yusuke Yamauchi

<To overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	-	-	-	-	-

Other researchers	-	-	-	0	0
Total	-	-	-	0	0

<From overseas satellite>

	FY 2020	FY 2021	FY 2022	FY 2023	Total
Principal investigators	-	-	-	3	3
Other researchers	-	-	-	0	0
Total	-	-	-	3	3

3. Holding and Participating in International Research Meetings

3-1. Holding international Research Meetings

- Indicate the number of international research conferences or symposiums held between FY 2020 and FY 2023, and give up to **five examples** of the most representative ones using the table below.

FY 2020: 3 meetings	FY 2021: 3 meetings	FY 2022: 3 meetings	FY 2023: 1 meeting
Major examples (meeting titles, places and dates held)		Number of participants	
MANA INTERNATIONAL SYMPOSIUM 2021 jointly with ICYS Online, March 2-3 2021		From domestic institutions: 325 From overseas institutions: 101	
MEMRISYS 2021 Hybrid (Online, Auditorium Namiki-site, NIMS), November 1-4, 2021		From domestic institutions: 82 From overseas institutions: 155	
WPI-MANA Virtual City of Workshops Hybrid (Online, Namiki-site Sengen-site NIMS), November 10-28, 2021		From domestic institutions: 524 From overseas institutions: 111	
WPI-MANA International Symposium 2022 Hybrid (Online, Auditorium Namiki-site NIMS), December 8-9, 2022		From domestic institutions: 505 From overseas institutions: 36	
MANA INTERNATIONAL SYMPOSIUM 2023 Auditorium Namiki-site NIMS, November 9-10, 2023		From domestic institutions: 232 From overseas institutions: 8	

3-2. Participating in International Research Meetings

- Give up to five examples of the most representative case in which the Center, not individual researchers, participated in international research meetings to enhance the visibility and brand of the Center or of the overall WPI Program

Meeting titles, places, dates held and number of participants	Form of participation (e.g. operating a booth)	Number of participants from the Center
CGC (Clustering & Global Challenges) 2021, Online, April 7-9, 2021, 206	Co-sponsored, Committee member, Invited Speaker	6
"NANOCAR RACE II – The International Molecule-Cars Race -", at CEMES-CNRS, Toulouse, France (March 24-25, 2022) About 60,000 online viewers in total	NIMS-MANA TEAM as the Representatives in charge of the device operation, image editing and outreach activities.	4
9th National conference on Science and Technology "Science for Society and Innovation for Prosperity", Kathmandu Nepal, June 26-28, 2022 300	Invited Speaker	2

4. List of the Cooperative Research Agreements with Overseas Institutions

- Indicate the number of agreements concluded with overseas institutions still in effect as of the end of FY 2023 (March 31, 2024).
Give five examples of the most representative agreements.

Number of effective agreements (as of March 31, 2024): 18

Five examples of the most representative agreements:

1. Name of the Agreement: MOU between MANA and London Centre for Nanotechnology (LCN) at University College London (UCL), UK (MANA Satellite)
 Dates of the Agreement: Signed: Jan 19, 2023. Valid until: Jan 19, 2028
 Counterpart in the Agreement: Prof. David R. Bowler
 (University College of London, UK, and MANA Satellite PI)
 Summary of the Agreement: Research collaboration on "*Electronic calculations of nanowires*"
2. Name of the Agreement: MOU between MANA and Queensland University of Technology (QUT), Brisbane, Australia
 Dates of the Agreement: Signed: Sep 2, 2021. Valid until: Jun 30, 2026
 Counterpart in the Agreement: Prof. Dmitri Golberg
 (Queensland University of Technology, and MANA Satellite PI)
 Summary of the Agreement: Research collaboration on "*Nanomaterial property studies*"
3. Name of the Agreement: MOU between MANA and University of Pennsylvania, USA
 Dates of the Agreement: Signed: Jun 22, 2020. Valid until: Jun 22, 2025
 Counterpart in the Agreement: Prof. Thomas E. Mallouk
 (University of Pennsylvania, USA, and MANA Satellite PI)
 Summary of the Agreement: Research collaboration on "*Nanoscale Chemistry*"
4. Name of the Agreement: MOU between MANA and iCAST, National Chung Hsing University (NCHU), Taiwan
 Dates of the Agreement: Signed: Jan 31, 2024. Valid until: Jan 31, 2029
 Counterpart in the Agreement: Prof. Kun-Yi (Andrew) Lin
 Summary of the Agreement: Research collaboration on "*Physical and Chemical functionalization of Nanoscale Materials*"
5. Name of the Agreement: MOU between MANA and Institute of Macromolecular Chemistry (IMC), Czech Academy of Sciences (CAS), Prague, Czech Republic
 Dates of the Agreement: Signed: Oct 9, 2020. Valid until: Oct 9, 2025
 Counterpart in the Agreement: Dr. Ing. Jiri Brus
 (Head of the Department of Structure and Dynamics of Macromolecules, The Institute of Macromolecular Chemistry, CAS)
 Summary of the Agreement: Research collaboration on "*Smart functional self-assemblies of supra- and macromolecular materials*"

5. Postdoctoral Positions through Open International Solicitations

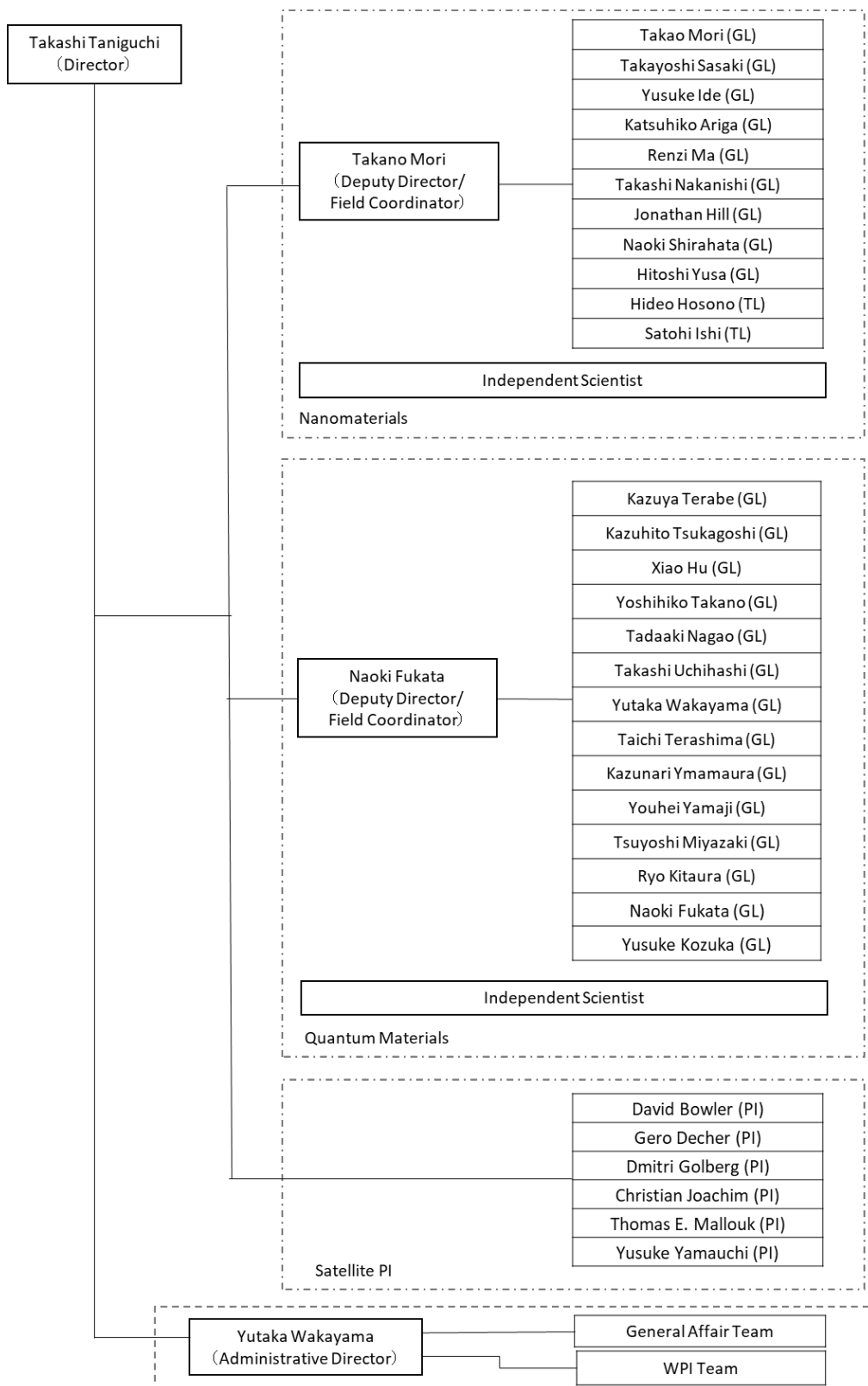
- In the columns "number of applications" and "number of selections," put the total number (upper) and the number and percentage of overseas researchers in the < > brackets (lower).
- In Appendix 3b, describe the status of employment of postdoctoral researchers.

Fiscal year	Number of applications	Number of selections
FY 2020	58	6
	< 53, 91%>	< 3, 50%>
FY 2021	30	6
	< 28, 93%>	< 6, 100%>
FY 2022	0	
	< 0, 0%>	< 0, 0%>
FY 2023	0	
	< 0, 0%>	< 0, 0%>

6. Diagram of Management System

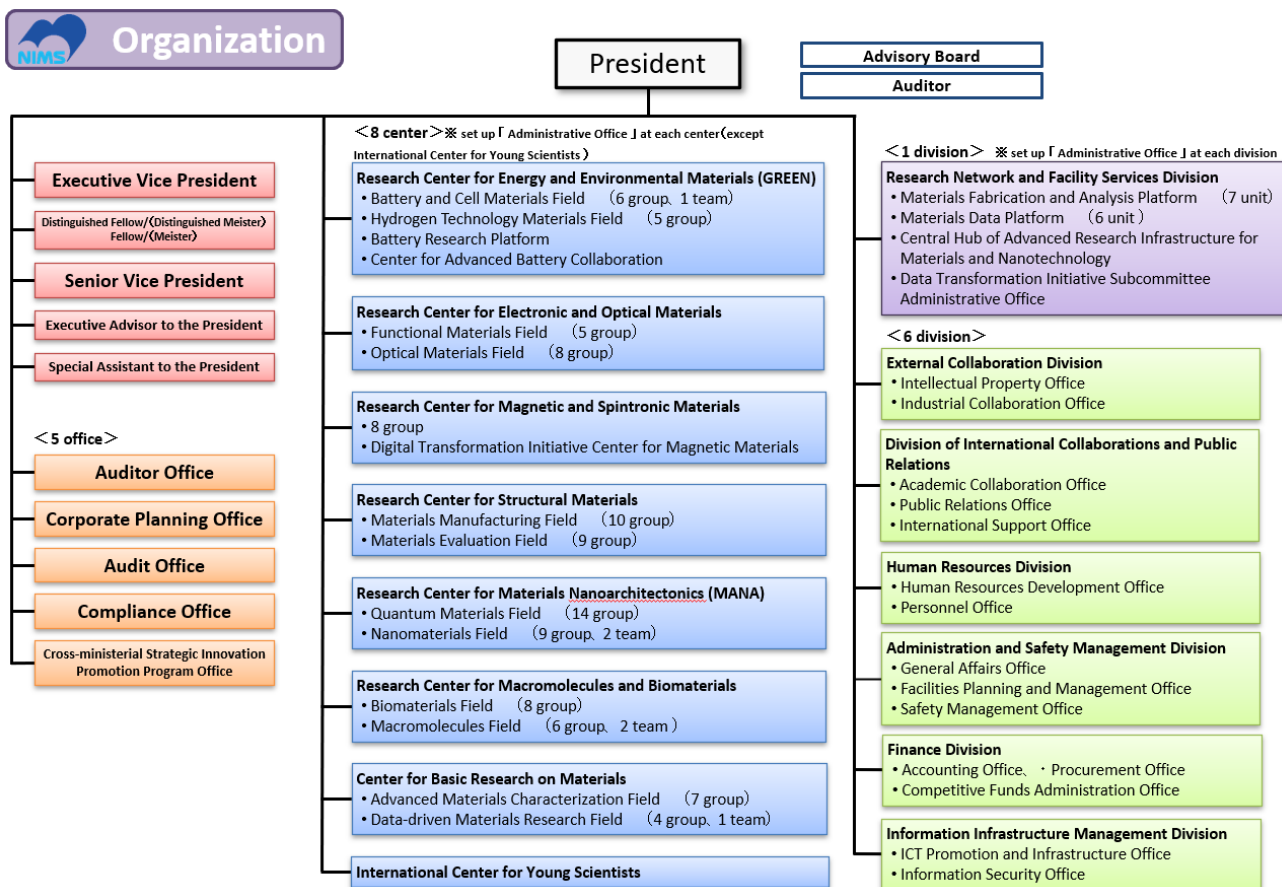
6-1.

- Diagram the Center's management system within the Center in an easily understood manner.
- If any changes have been made in the Center's management system vis-à-vis that stated in the application for WPI Academy center certification, describe them. Especially describe any important changes made in such as the center director, administrative director, head of host institution, and officer(s) in charge at the host institution (e.g., executive vice president for research).



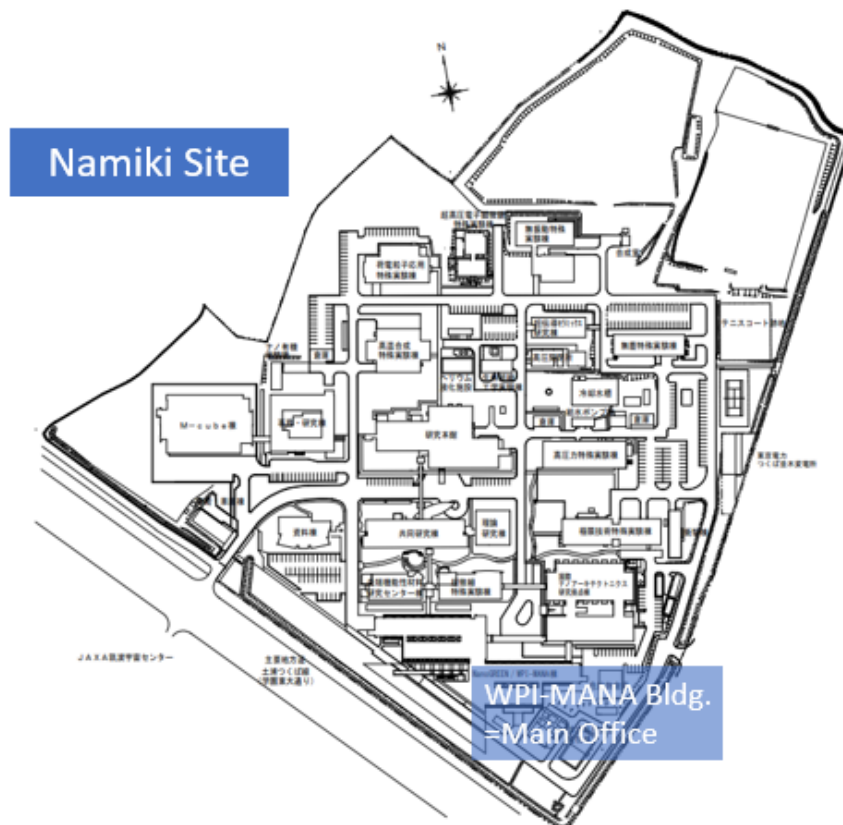
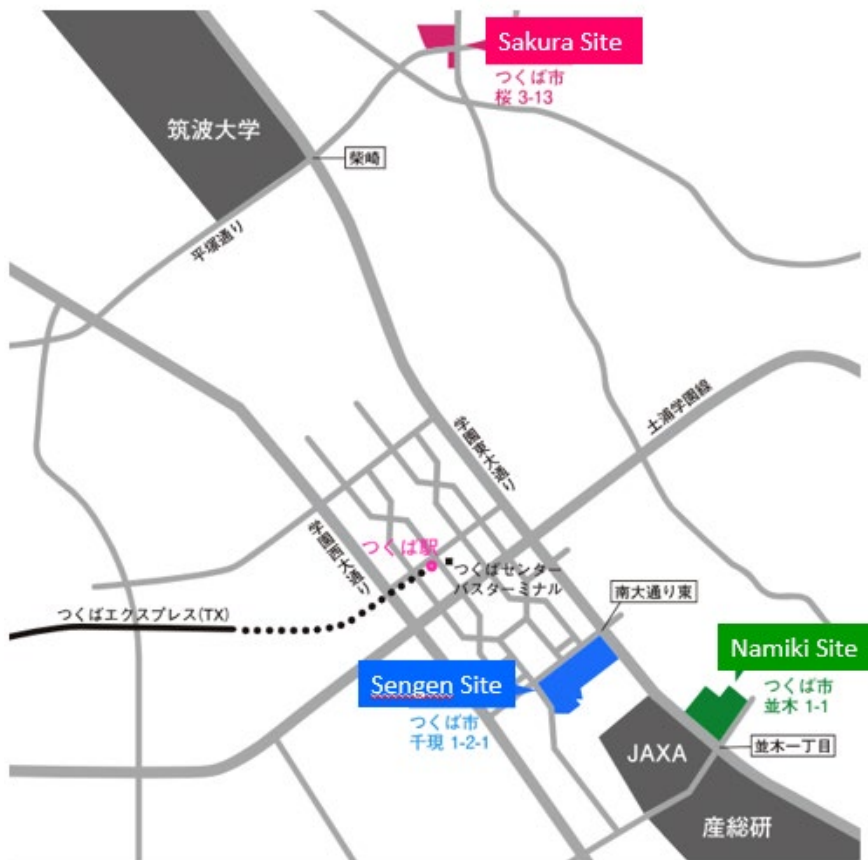
6-2.

- Make a diagram of the organizational chart to show Center's position **within the host institution**.



7. Campus Map

- Draw a simple map of the campus showing where the main office and principal investigator(s) are located.



Appendix3-1a Number of Center Personnel FY 2020-FY 2023

		FY 2020		FY 2021		FY 2022		FY 2023	
		Number of persons	%	Number of persons	%	Number of persons	%	Number of persons	%
	Researchers	170		169		192		165	
	Overseas researchers	68	40	64	38	83	43	67	41
	Female researchers	17	10	15	9	20	10	16	10
	Principal investigators (PIs)	22		22		20		7	
	Overseas PIs	8	36	8	36	7	35	6	86
	Female PIs	1	5	1	5	1	5	1	14
	Other researchers	82		79		79		90	
	Overseas researchers	13	16	14	18	14	18	13	14
	Female researchers	5	6	5	6	5	6	4	4
	Postdocs	66		68		93		68	
	Overseas Postdocs	47	71	42	62	62	67	48	71
	Female Postdocs	11	17	9	13	14	15	11	16
	Research support staffs	78		84		91		82	
	Administrative staffs	26		28		28		24	
TOTAL		274		281		311		271	

Number of persons who were/have been paid using the host institution's operating budget (excluding indirect funding) among the above persons.

	FY 2020	FY 2021	FY 2022	FY 2023
Principal investigators (PIs)	14	13	11	0
Other researchers	74	73	78	89
Postdocs	26	24	33	16
Research support staffs	55	50	50	48
Administrative staffs	25	26	25	21

※ Make consistent with the number of persons reported in Appendix 3-2.

		FY 2020		FY 2021		FY 2022		FY 2023	
		Number of persons	%	Number of persons	%	Number of persons	%	Number of persons	%
	Doctoral students	68		65		80		81	
	Employed	30	44.1	29	44.6	34	42.5	36	44.4

※ The number of doctoral students indicated in the lower table can also include those in the upper table of Total numbers.

Changes vis-à-vis the Center's application for academy center certification

※ If changes have been made vis-à-vis the Center's application for academy center certification, describe the main changes and the reasons for them.

Appendix 3-1b Career Path of WPI Postdocs

Enter the information below during the period from the start of the center through the end of FY 2023.

* For each person, fill in the spaces to the right. More spaces may be added.

* Leave "Position as of April 2024" blank if unknown.

Japanese Postdocs

Employment period	Position before employed at WPI center		Next position after WPI center		Position as of April 2024*	
	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located
2007/10-2010/3	AIST, Postdoc fellow	Japan	Tokyo Zoukei U., Lecturer	Japan	U. Tokyo, Researcher	Japan
2007/10-2011/3	Kumamoto U., JSPS fellow	Japan	Kyushu U., Associate professor	Japan	Kyushu U., Associate professor	Japan
2008/4-2010/3	U. Tsukuba, PhD Candidate	Japan	TIT, Assistant professor	Japan	Kitasato U., Lecturer	Japan
2008/4-2010/3	Osaka U., Postdoc fellow	Japan	AIST, Postdoc fellow	Japan		
2008/4-2010/8	Rice U., Graduate research assistant	USA	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan
2008/4-2011/3	NIMS, JST-I CORP fellow	Japan	Mitsuboshi Diamond Ltd., Researcher	Japan		
2008/4-2011/3	Meijo U., JSPS fellow	Japan	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan
2008/4-2011/3	U. Tsukuba, PhD Candidate	Japan	RIKEN, JSPS fellow	Japan	Nat. Inst. of Technology (KOSEN), Nagano College, Associate professor	Japan
2008/4-2012/6	Tohoku U., Postdoc fellow	Japan	Tohoku U., Assistant professor	Japan	Oita U., Associate professor	Japan
2008/5-2011/4	Kanagawa U., Postdoc fellow	Japan	Suzhou U., Postdoc fellow	China	Kanagawa U., Technical engineer	Japan
2008/7-2010/3	U. Coll. London, LCN, Postdoc fellow	UK	U. of Bologna, Research Fellow	Italy	Tokyo Denki U., Professor	Japan

2008/10-2010/3	Tokyo U. of Agriculture &Tech., PhD Candidate	Japan	Ultizyme International Ltd., Researcher	Japan		
2008/12-2011/9	U. Tokyo, Researcher	Japan	TDK, Researcher	Japan		
2009/3-2010/4	Lund U., Postdoc fellow	Sweden	U. of California, Irvine, Postdoc fellow	USA	Missouri State U., Associate professor	USA
2009/4 -2014/3	Waseda U., JSPS fellow	Japan	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan
2009/4-2011/3	U. Coll. London, LCN, Postdoc Fellow	UK	Tohoku U., Assistant professor	Japan	Chiba Inst. of Tech., Professor	Japan
2009/4-2011/7	TIT, PhD Candidate	Japan	Yamagata U., Associate professor	Japan	Tokyo Metropolitan Industrial Tech. Research Inst., Senior researcher	Japan
2009/4-2011/7	U. of Basel, Visiting scientist	Switzerland	NIMS, Independent scientist	Japan	NIMS, Permanent researcher	Japan
2009/4-2013/3	U. Tsukuba, Project assistant professor	Japan	NIMS, Postdoc fellow	Japan	RIKEN, Researcher	Japan
2009/11-2010/6	Japan Women's U., Postdoc fellow	Japan	U. Electro-Communications, Associate professor	Japan	U. Electro-Communications, Professor	Japan
2009/11-2010/11	U. Tokyo, PhD Candidate	Japan	NIMS, JSPS fellow	Japan	Tokyo Denki U., Lecturer	Japan
2010/4-2012/3	U. Tsukuba, PhD Candidate	Japan	Tokyo U. of Sc., Associate professor	Japan		
2010/4-2012/3 2013/6-2016/5	Kagoshima U., PhD Candidate U. Alberta, Postdoc fellow	Japan Canada	U. Alberta, Postdoc fellow Shizuoka Inst. S&T, Lecturer	Canada Japan	Shizuoka Inst. S&T, Associate professor	Japan
2010/4-2012/6	Osaka Prefecture U., PhD Candidate	Japan	NIMS, Independent scientist (Permanent Position)	Japan	NIMS, Permanent researcher	Japan
2010/4-2012/8	Kyoto U., PhD Candidate	Japan	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan

2010/4-2013/3	Osaka U., Postdoc fellow	Japan	Maeda and Partners, Patent office staff	Japan	Maeda and Partners, Patent office staff	Japan
2010/8-2013/3	Kyushu U., JSPS fellow	Japan	Waseda U., Assistant professor	Japan	TIT, Assistant professor	Japan
2010/9-2011/11	U. of Oklahoma, Postdoc fellow	USA	Private Company, N/A	USA		
2010/10-2011/3	U. Tsukuba, PhD Candidate	Japan	NIMS, Engineer (Permanent Position)	Japan	NIMS, Engineer (Permanent Position)	Japan
2011/4 -2013/6	Kyushu U., PhD Candidate	Japan	NIMS, Permanent researcher	Japan	Kyushu U., Associate professor	Japan
2011/4-2012/4	U. Tsukuba, PhD Candidate	Japan	Lawrence Berkeley Natl. Lab., Visiting Research Scholar	USA		
2012/3-2013/2	Paris-Sud U., LPS, Postdoc fellow	France	NIMS, Postdoc fellow	Japan	KIOXIA Corporation, N/A	Japan
2012/4 -2016/7	Waseda U., PhD Candidate	Japan	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan
2012/4 -2015/1	Tsukuba U., JSPS fellow	Japan	Mitsubishi Elec. Corporation, N/A	Japan	Mitsubishi Elec. Corporation, N/A	Japan
2012/4-2012/11	U. Tokyo, PhD Candidate	Japan	Yamanashi U., Assistant professor	Japan	Yamanashi U., Associate professor	Japan
2012/6-2018/3	U. Tsukuba, PhD Candidate	Japan	U. Tokyo , JSPS fellow,	Japan	Mitsubhishi Gas Chemical, N/A	Japan
2012/7 -2014/3	Keio U., Postdoc fellow	Japan	Sapporo Sacred Heart Sch., Teacher	Japan		
2012/10-2014/9 2015/8-2018/3	U. Tokyo, Postdoc fellow	Japan	NIMS, Postdoc fellow NIMS, Permanent	Japan	NIMS, Permanent researcher	Japan
2013/4-2014/3	U. Tsukuba, PhD Candidate	Japan	Tokyo U. of Sc., Assistant professor	Japan	Tokyo U. of Sc., Junior Associate professor	Japan
2013/4 -2015/3	U. Tsukuba, Postdoc fellow	Japan	Tokyo U. of Agriculture & Tech., Assistant professor	Japan	U. of Yamanashi., Assistant professor	Japan
2013/4-2014/12 2016/3-2018/7	NIMS, Postdoc fellow Kent State U., Postdoc fellow	Japan USA	KENT State U., Postdoc fellow	USA	Kyoto U., Associate professor	Japan
2013/4-2017/3	Okayama U., JSPS student	Japan	Kyoto U., JSPS fellow	Japan	Osaka U., Assistant professor	Japan

2013/4-2018/1	Meiji U., PhD Candidate	Japan	NIMS, Postdoc fellow	Japan	Sumitomo Heavy Industries, Ltd., N/A	Japan
2013/4-2020/2	Meiji U., Student	Japan	Sony Corporation, Engineer	Japan		
2013/5-2017/3	NIMS, Postdoc fellow	Japan	NIMS, Postdoc researcher	Japan	NIMS, Permanent researcher	Japan
2013/6 -2015/3	NIMS, Postdoc fellow	Japan	Tokyo U. of Sc., Postdoc fellow	Japan	NIMS, Permanent researcher	Japan
2013/6-2015/5	Inst. for Molecular Sc., Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan		
2013/8 -2016/3	NIMS, Postdoc fellow	Japan	Osaka U., Assistant professor	Japan	Kansai U., Associate professor	Japan
2014/4 -2015/3	Kumamoto U., Assistant professor	Japan	Kitakyushu Coll., Natl. Inst. Tech., Assistant professor	Japan	Nagaoka U. of Technology, Associate Professor	Japan
2014/4 -2016/3	U. Tokyo, PhD Candidate	Japan	Tokyo Metropolitan U., Lecturer	Japan		
2014/4-2015/12	Hokkaido U., JSPS fellow	Japan	Sagami Chem. Res. C., Postdoc fellow	Japan		
2014/4-2016/10	Kyushu U., Researcher	Japan	AIST, Researcher	Japan	Kogakuin U., Associate professor	Japan
2014/4-2017/3	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan		
2014/4-2018/3	Meiji U., PhD Candidate	Japan	Appl. Mat. Japan Inc., Researcher	Japan	Appl. Mat. Japan Inc., Researcher	Japan
2014/4-2018/3	UCLA, Postdoc fellow	USA	Tokyo Electron Ltd., Researcher	Japan	Tokyo Electron Ltd., Researcher	Japan
2014/5-2014/11	U. Tokyo, PhD Candidate	Japan	Tokyo Metropolitan Industrial Tech. Research Inst., Officer	Japan	Tokyo Metropolitan Industrial Tech. Research Inst, Associate Senior	Japan
2015/1-2017/9	U. Tokyo, Project assistant professor	Japan	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan
2015/4-2017/12	RIKEN, Postdoc fellow	Japan	Kumamoto U., Assistant professor	Japan	Kumamoto U., Associate professor	Japan
2015/4-2018/3	Technical U. of Berlin, Postdoc fellow	Germany	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan

2015/4-2018/3	U. Tsukuba, PhD Candidate	Japan	TEIJIN Ltd., Researcher	Japan	TEIJIN Ltd., Researcher	Japan
2015/5-2017/3	Natl. Inst. of Standards and Tech., Guest researcher	USA	NIMS, Postdoc fellow	Japan	NIMS, Engineer (Permanent researcher)	Japan
2016/4-2017/3	U. Tsukuba, Postdoc fellow	Japan	Kyushu Inst. of Tech., Assistant professor	Japan	Kyushu Inst. of Tech., Associate professor	Japan
2016/4-2018/3	U. Tsukuba, Postdoc fellow	Japan	U. Tokyo, Academic support staff	Japan	U. Tokyo Hospital, Project researcher	Japan
2016/4-2019/3	Waseda U., Student	Japan	Sony Corporation, Engineer	Japan		
2016/4-2019/3	NIMS, Postdoc fellow	Japan	NIMS, JSPS fellow	Japan	NIMS, Permanent researcher	Japan
2016/4-2019/3	Waseda U., Student	Japan	SONY Corporation, Engineer	Japan		
2016/6-2019/3	U. Tsukuba, PhD Candidate	Japan	Zeon Corporation, N/A	Japan	Zeon Corporation, N/A	Japan
2016/10-2018/10	U. of Washington, Postdoc fellow	USA	NIMS, Independent scientist (Permanent researcher)	Japan	NIMS, Permanent researcher	Japan
2016/12-2017/10	Meiji U., Assistant professor	Japan	SUMSANG Japan Corporation, Researcher	Korea		
2017/1-2019/3	U. Tokyo, Project research fellow	Japan	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan
2017/4-2018/3	U. Tokyo, PhD Candidate	Japan	TIT, Assistant professor	Japan	TIT, Assistant professor	Japan
2017/4-2019/3	NIMS, Postdoc fellow	Japan	NETZSCH Japan, N/A	Japan		
2017/4-2019/3	U. Tsukuba, PhD Candidate	Japan	Panasonic Corporation, Engineer	Japan	Panasonic Corporation, Engineer	Japan
2017/4-2020/3	Meiji U., Student	Japan	Panasonic Corporation, Engineer	Japan		
2017/5-2018/3	U. Tokyo, PhD Candidate	Japan	NIMS, Postdoc fellow	Japan	Shiga U., Assistant professor	Japan
2017/9-2020/3	Tokyo U. of Sc., Student	Japan	Ricoh Company, Ltd., Engineer	Japan		

2017/9-2020/3	Tokyo U. of Sc., Student	Japan	Canon Inc., Engineer	Japan		
2018/3-2019/7	Seijo U., Project assistant professor	Japan	U. Tokyo, Project assistant professor	Japan		
2018/3-2020/3	U. Tokyo, JSPS Fellow	Japan	PI Crystal, Inc., Engineer	Japan		
2018/4-2018/7	Kumamoto U., PhD Candidate	Japan	KIOXIA Corporation, Engineer	Japan		
2018/4-2019/3	Tokyo Metropolitan U., Postdoc fellow	Japan	Tokyo Metropolitan U., Project assistant professor	Japan	AIST, Senior Researcher	Japan
2019/4-2020/3	U. Tokyo, PhD Candidate	Japan	U. Tokyo, JSPS fellow	Japan	Osaka U., Assistant professor	Japan
2017/10-2020/6	U. Tokyo, Specially appointed researcher	Japan	Kyoto U. of Advabced Sc., Assistant professor	Japan	Kyoto U. of Advabced Sc., Assistant professor	Japan
2018/4-2020/10	JAIST, JSPS fellow	Japan	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan
2018/10-2021/9	U. Tokyo, PhD Candidate	Japan	NIMS, ICYS research fellow	Japan	NIMS, Permanent researcher	Japan
2019/4-2022/3	Waseda U., Assistant	Japan	AIST, Permanent researcher	Japan	AIST, Permanent researcher	Japan
2019/4-2023/3	Nagoya University, JSPS fellow	Japan	Tokyo U. Of Sc., Assistant professor	Japan	Tokyo U. Of Sc., Assistant professor	Japan
2019/4-2022/12	U. of Tokyo, PhD Candidate	Japan	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan
2020/3-2020/8	NIMS, Technical staff	Japan	U. of Tsukuba, Assistant professor	Japan		
2020/4-2023/3	U. Tsukuba, PhD Candidate	Japan	NIMS, ICYS research fellow	Japan	NIMS, ICYS research fellow	Japan
2020/8-2021/3	Chiba U., Project assistant professor	Japan	Chiba U., Project assistant professor	Japan		
2020/11-2022/5	Hokkaido U., PhD Candidate	Japan	Fuji Film, Researcher	Japan	Fuji Film, Researcher	Japan
2021/1-2023/3	NIMS, Postdoc fellow	Japan	OIST, Postdoctral Scholar	Japan	OIST, Postdoctral scholar	Japan
2021/4-2024/3	U. Tokyo, N/A	Japan	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan

2021/4-2021/10	Tohoku U., PhD Candidate	Japan	Tohoku U., Assistant professor	Japan	Tohoku U., Assistant professor	Japan
2021/4-2023/3	AIST, Posdoc fellow	Japan	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan
2021/4-2023/3	Tokyo Inst. of Tech., PhD Candidate	Japan	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan
2021/8-2023/3	Shenzhen U., Postdoc Fellow	China	Sgami Chemical Res. Inst., Researcher	Japan	Sgami Chemical Res. Inst., Researcher	Japan
2022/4-2023/3	Tokyo U. of Science, PhD Candidate	Japan	N/A			
2022/4-2023/3	U. Miyazaki, PhD Candidate	Japan	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan
2022/4-2023/3	Tokyo Inst. of Tech., PhD Candidate	Japan	AIST, Researcher	Japan	AIST, Researcher	Japan
2017/7-2024/3	Kyushu Institute of Tech., Doctor	Japan	Tokyo Institute of Tech., Postdoc	Japan	Tokyo Institute of Tech., Postdoc	Japan

Overseas Postdocs

Employment period	Position before employed at WPI center		Next position after WPI center		Position as of April 2024*		Nationality
	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	Position title, organization	Country where the organization is located	
2007/10-2009/10	Bergische U. Wuppertal, Humboldt Research fellow	Germany	ADOCIA Lyon, Head of Chem. Team, N/A	France	Astellas Pharma, N/A	Japan	French
2007/10-2009/8	U. of S&T of China, Research assistant	China	AIST, Researcher	Japan	Capital Normal U., Associate professor	China	Chinese
2007/12-2009/11	U. Bayreuth, Research fellow	Germany	Ashapura Minechem Ltd., R&D manager	India			Indian
2008/1 -2009/5	U. Tsukuba, PhD Candidate	Japan	Japan Fine Ceramics Center, Senior researcher	Japan	Mie U., Professor	Japan	Chinese
2008/2-2008/3	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan	SRMIST, Assistant professor	India	Indian
2008/4-2008/12	Ben-Gurion U., Iise Kartz C. for Meso & Nanoscale S&T , Postdoc	Israel	IACS, C. for Adv. Mat., Scientist	India	IACS, Senior professor	India	Indian

2008/4-2008/8	CAS, Postdoc fellow	China	Changchun Inst. of Appl. Chem., CAS, Professor	China	Changchun Inst. of Appl. Chem., CAS, Professor	China	Chinese
2008/4-2009/7	U. Oxford, Material Sc., MSc by research	UK	Max Planck Inst. for Polymer Res., Postdoc fellow	Germany			Italian
2008/4-2009/9	Imperial Coll. London, Postdoc fellow	UK	Panasonic Manufacturing UK Ltd., Fuel Cell R&D Engineer	UK	BIA Energy Consulting Limited, N/A	UK	British
2008/4-2010/2	Tohoku U., JST fellow	Japan	Uppsala U., Associate professor	Sweden	Uppsala U., N/A	Sweden	Swedish
2008/4-2010/2	U. Tsukuba, PhD Candidate	Japan	U. Alabama, MINT, Postdoc fellow	USA			Indian
2008/4-2010/3	U. Heidelberg, Postdoc fellow	Germany	H.C.Starck Ltd., Associate manager	Germany			German
2008/4-2010/3	RIKEN, JST CREST researcher	Japan	Tokyo U. of Sc., Associate professor	Japan			Chinese
2008/4-2010/3	TIT, Postdoc fellow	Japan	Committee of Zhejiang Qúzhōu High-Tech Park, Section chief	China			Chinese
2008/4-2010/8	U. Tokyo, Postdoc fellow	Japan	Shanghai Jiao Tong U., D. Phys. & Astronomy, Research	China	Shanghai Jiao Tong U., Professor	China	Chinese
2008/4-2010/9	Brigham Young U., Analytical Chem., PhD Candidate	USA	NIMS, Postdoc fellow	Japan			American
2008/4-2011/3	Indian Institute of Sc., PhD Candidate	India	Jawaharlal Nehru C. for Adv., Sc. Res. Faculty (Ramanujan)	India	IISER Mohali, Assistant professor	India	Indian
2008/4-2011/7	U. Tsukuba, PhD Candidate	Japan	Los Alamos Natl. Lab., Theoretical Div., Postdoc	USA	Los Alamos Natl. Lab., Staff scientist	USA	Chinese
2008/4-2012/3	Zhongxin International Semiconductor Develt. Co., Ltd,	China	Tianjin U., Associate professor	China	East China U. of S&T, Associate professor	China	Chinese
2008/6-2011/3	Inst. of Metal Research, CAS, PhD Candidate	China	Ningbo Inst. Mat. Tech. & Eng., CAS, Associate professor	China	Southwest Jiaotong U., Professor	China	Chinese
2008/6-2011/3	Peking U., D. of Elec., Postdoc fellow	China	MIT, Postdoc fellow	USA	Xiamen U., Minjiang scholar chair professor	China	Chinese
2008/7-2009/7	Zhejiang U. Hangzhou, D. of Phys., Professor	China	Zhejiang U. Hangzhou, D. of Phys., Professor	China	Zhejiang U. Hangzhou, D. of Phys., Professor	China	Chinese
2008/7-2011/3	AIST, JSPS fellow	Japan	Hebei U. of Tech., Sch. of Mat. Sc. & Eng., Professor	China	Soochow U., Professor	China	Chinese

2008/7-2010/7	Nanyang Technological U., Postdoc fellow	Singapore	Griffith U., Environmental Futures Res. Inst., Research	Australia	U. Jinan (UJN), Sch. of Phys. & Tech., Professor	China	Chinese
2008/7-2010/9	U. Karlsruhe, Visiting scientist	Germany	Nanjing U. of Aeronautics and Astronautics, Professor	China	Nanjing U. of S&T, Professor	China	Chinese
2008/7-2010/10	Res. Inst. of Petroleum Industry, Researcher	Iran	Yazd U., Phys. D., Assistant professor	Iran	Yazd U., Associate professor	Iran	Iranian
2008/8-2010/7	NIIST, Researcher	India	Gov. Medical Coll., D. of Neurology, Researcher	India	Shell Tech. C., Bangalore, Research scientist	India	Indian
2008/8-2011/3	TIT, Postdoc fellow	Japan	Meiji U., Researcher	Japan			Chinese
2008/8-2010/8 2013/4-2014/8	IOP, CAS, Assistant professor IOP, CAS, Assistant professor	China	Inst. High Energy Phys., IOP, Associate professor	China	Songshan Lake Materials Laboratory, Researcher	China	Chinese
2008/8-2010/8	Defense Metallurgical Res. Lab., Scientist	India	Indira Gandhi C. for Atomic Research, Kalpakkam,	India	ARCI, IITs Chennai, Regional Director	India	Indian
2008/8-2009/8	IOP, CAS, Postdoc	China	Wuhan Inst. of Phys.& Math., Associate professor	China	Wuhan Inst. of Phys.& Math., Associate professor	China	Chinese
2008/8-2010/12	Wuhan U., PhD Candidate	China	UC San Diego, Postdoc fellow	USA	U. of Electronic S&T of China, Professor	China	Chinese
2008/9-2009/8	IOP, CAS, PhD Candidate	China	IOP, CAS, Associate professor	China	IOP, CAS, Professor	China	Chinese
2008/9-2010/8	Shanghai Inst. of Ceramics, CAS, Researcher	China	U. South Australia, D. Information Tech., Research	Australia	Changzhou U., Lecturer	China	Chinese
2008/9-2011/3	Indian Inst. of Chem. Tech., Senior research fellow	India	NIMS, Postdoc fellow	Japan	IITs Roorkee, Associate professor	India	Indian
2008/9-2011/3	CAS, Research associate	China	NIMS, ICYS researcher	Japan			Chinese
2008/9-2011/3	U. of Hyderabad, PhD Candidate	India	North Carolina State U., Postdoc	USA	UNC-Chapel Hill, Postdoctoral Research associate	India	Indian
2008/9-2011/8	Inst. of Solid State Phys., CAS, Assistant professor	China	Fudan U., Professor	China	Fudan U., Professor	China	Chinese
2008/9-2010/9	Moscow State U., PhD Candidate	Russia	Agrorus Company-Ryazan, Leading engineer	Russia			Russian
2008/10-2009/10	Seoul Natl. U., Postdoc fellow	Korea	AIST, Researcher	Japan	Shanghei Jiao Tong U., Associate professor	China	Chinese

2008/10-2009/3	Tohoku U., Postdoc fellow	Japan	Southeast U., Professor	China	Southeast U., Processor	China	Chinese
2008/10-2009/3	Nanjing U., PhD Candidate.	China	Jiangsu U., Professor	China			Chinese
2008/10-2009/6	TIT, JSPS fellow	Japan	Imperial Coll. London, D. Electrical & Elec. Eng., Postdoc	UK	Minzu U. of China, Professor	China	Chinese
2008/10-2012/10	Changchun Inst. of Appl. Chem., Postdoc fellow	China	Changchun Inst. Appl. Chem., S.K.L. Electroanalytical Chem.,	China			Chinese
2008/11-2011/3	Shanghai Inst. of Ceramics, Assistant researcher	China	Kochi U., Postdoc fellow	Japan			Chinese
2008/11-2009/3	China U. of Petroleum, Assistant professor	China	Tsinghua U., Assistant professor	China			Chinese
2008/11-2009/8	The Chinese U. of Hong Kong, Postdoc fellow	China	HUST, S.K.L. Mat. Proc. and Die & Mold Tech., Associate	China			Chinese
2008/11-2011/3	Yokohama Natl. U., JSPS fellow	Japan	ARCI, Leader	India			Indian
2008/12-2010/3	Zhejiang Univ, S.K.L. of Silicon Mat., PhD Candidate	China	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan	Chinese
2008/12-2009/11	Sungkyunkwan U., Senior researcher	Korea	Samsung Elec. Co., Ltd., Researcher	Korea			Korean
2009/2-2010/7	Saha Inst. of Nuclear Phys., Postdoc fellow	India	Visva-Bharati U., D. of Phys., Assistant professor	India	Visva-Bharati U., D. of Phys., Professor	India	Indian
2009/3-2010/4	Autonomous U. of Barcelona, Assistant professor	Spain	Max Planck Inst., Intelligent Systems, Group leader	Germany	Institute for Bioengineering of Catalonia, Professor	Spain	Spanish
2009/3-2011/10	Lanzhou Inst. of Chem. Phys., CAS, PhD Candidate	China	Lanzhou U., Professor	China	Lanzhou Inst. of Chem. Phys., CAS, Professor	China	Chinese
2009/3-2011/3	U. of Aveiro, D. of Chem., Postdoc fellow	Portugal	Jilin U., Associate professor	China	Jilin U., Professor	China	Chinese
2009/4-2009/9	Bhabha Atomic Res. C., Scientific officer	India	Bhabha Atomic Res. C., Scientific officer	India			Indian
2009/4-2010/3	U. Tokyo, JSPS Fellow	Japan	Korea Institute of Energy Research, Professor	Korea	Dongguk U., Professor	Korea	Italian
2009/4-2010/3	IITs, Senior project associate	India	Nagoya Inst. of Tech., VBL Postdoc fellow	Japan			Indian

2009/4-2011/3	Natl. U. Singapore, Postdoc fellow	Singapore	Inst. of Process Eng., CAS, Researcher	China	Beijing Inst. of Process Engineering, Professor	China	Chinese
2009/4-2012/3	Monash U., Postdoc fellow	Australia	Helmholtz-Zentrum Geesthacht, Scientist	Germany	Brunel U. London, Head of Academic Affairs,	UK	Australian
2009/5-2010/3	AIST, Postdoc fellow	Japan	South China Normal U., Professor	China	South China Normal U., Professor	China	Chinese
2009/5-2012/3	Shizuoka U., Researcher	Japan	Shouxihu, Yangzhou U., Chem.& Chem. Eng., Assistant	China	Shouxihu, Yangzhou U., Chem.& Chem. Eng.,	China	Chinese
2009/5-2014/4	Jabalpur U., Surface Phys. D., PhD Candidate	India	Tohoku U., Research assistant	Japan	Central U. of South Bihar, UGC Assistant professor	India	Indian
2009/6-2011/5	Inst. of Solid State Phys., CAS, Research fellow	China	Kyoto U., Postdoc fellow	Japan			Chinese
2009/6-2011/5	U. Rome, D. of Chem. S&T, Postdoc fellow	Italy	U. of Rome, Postdoc fellow	Italy			Italian
2009/7-2010/12	UC Santa Barbara, Postdoc fellow	USA	LIM Innovations, Chief technology officer	USA	Global Tech. Connection, Managing Engineer	USA	American
2009/7-2012/3	Jawaharlal Nehru U., Raman Res. Inst., PhD Candidate	India	NIMS, Postdoc fellow	Japan	IITs Patna, Assistant professor	India	Indian
2009/7-2010/7	Autonomous U. of Barcelona, Postdoc fellow	Spain	Nanyang Technological U., Postdoc fellow	Singapore	Nanyang Technological U. Sc. Of Chem., Senior lecturer	Singapore	Italian
2009/7-2012/10	Nanyang Technological U., Div. of Phys. & Appl. Phys., Postdoc fellow	Singapore	Changchun Inst. of Optics, Fine Mechanics and Phys., Professor	China	Changchun Inst. of Optics, Fine Mechanics and Phys., Professor	China	Chinese
2009/8-2011/3	Indian Inst. of Chem. Tech., Senior research fellow	India	UC Berkeley, Postdoc fellow	USA	Deckman Coulter, Manager Product management	USA	Indian
2009/8-2014/7	Institute of Phys., CAS, PhD Candidate	China	U. of Strasbourg, Nanochemistry Lab., Postdoc	France	Nanjing U., Electronic Engineering, Professor	China	Chinese
2009/8-2010/8	U. Oxford, Postdoc fellow	UK	U. Tsukuba, Project Associate professor	Japan	Shibaura Institute of Technology, Associate professor	Japan	British
2009/9-2012/8	U. of S&T, D. of Mat. Sc. & Eng., PhD Candidate	China	Xi'an Technological U., Assistant professor	China			Chinese
2009/9-2011/9	AIST, Postdoc Fellow	Japan	NIMS, Permanent Researcher	Japan			Chinese
2009/10-2011/3	Nanjing U., PhD Candidate	China	NIMS, Postdoc fellow	Japan	CNST/UMD, NIST Postdoc associate	USA	Chinese

2009/10-2013/11	AIST, Postdoc Fellow	Japan	Natl. C. for Nanoscience & Tech. China, Associate professor	China	Natl. C. for Nanoscience & Tech. China, Professor	China	Chinese
2009/10-2012/9	Osaka U., JSPS fellow	Japan	U. Tokyo, Project Assistant professor	Japan	Natl. Inst. of Information and Communications Tech., Senior	Japan	Korean
2009/10-2012/9	Max Planck Inst. of Colloids and Interfaces, Postdoc fellow	Germany	Southeast U., Sch. of Chem. & Chem. Eng., Professor	China	Southeast U., Sch. of Chem. & Chem. Eng., Professor	China	Chinese
2010/1-2013/1	Cornell U., Postdoc fellow	USA	Changchun Inst. of Appl. Chem., N/A	China			Chinese
2010/3-2010/3	IITs, PhD Candidate	India	Tohoku U., JSPS fellow	Japan	CSIR-CECRI, Karaikudi, Principal scientist	India	Indian
2010/3-2013/1	IOP Chem. Cordoba, Postdoc fellow	Argentina	UC Berkeley, Postdoc	USA	INFIQC-CONICET, Assistant researcher	Argentina	Argentine
2010/4-2011/3	Saitama U., PhD Candidate	Japan	U. of Nova Gorica, Marie Curie fellow	Slovenia	U. of Nova Gorica, Associate professor	Slovenia	Bulgarian
2010/4-2011/3	IOP, CAS, PhD Candidate	China	U. Oxford, Postdoc	UK	Shanghai Tech. U., Associate professor	China	Chinese
2010/4-2011/9	Osaka U., Associate professor	Japan	CSIR-Indian Institute of Chem. Tech., Scientist	India	CSIR-Indian Institute of Chem. Tech., Principal scientist	India	Indian
2010/4-2012/3	U. Tsukuba, PhD Candidate	Japan	U. of New South Wales, Research associate	Australia	Shanghai Institute of Ceramics Chinese Academy of Science, PI	China	Chinese
2010/4-2012/4	Stanford U., Mat. Sc. & Eng., Postdoc fellow	USA	Korea Res. Inst. of Standards and Sc., Senior researcher	Korea	HANBAT Natinal U., Associate professor	Korea	Korean
2010/4/-2012/7	Yokohama Natl. U., Postdoc fellow	Japan	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan	Nepalese
2010/4-2012/9	The Chinese U. of Hong Kong, Research assistant	China	Sun Yat-Sen U., Sch. of Phys.& Eng., Associate professor	China			Chinese
2010/4-2013/3	RIKEN, JST researcher	Japan	Tokyo Metropolitan U., Assistant professor	Japan			Jordanian
2010/4-2013/3	GIT., Sch. Mat. Sc. & Eng., PhD Candidate	USA	TIT, Postdoc fellow	Japan			Chinese
2010/4-2015/8	Jawaharlal Nehru C. for Adv. Sc. & Res., PhD Candidate	India	IISER Tirupati, D. of Phys., Assistant professor	India	IISER Tirupati, D. of Phys., Associate professor	India	Indian
2010/5-2012/3	Warsaw U. of Tech., Postdoc fellow	Poland	Warsaw U. of Tech., Research assistant	Poland			Polish

2010/5-2012/4	Tohoku U., Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan			Korean
2010/5-2011/3	Huazhong Normal U., PhD Candidate	China	Hebei U. of Tech., Sch. of Mat. Sc. & Eng., Professor	China			Chinese
2010/6-2012/3	U. of Pennsylvania, Phys. Chem. Biomaterials, Postdoc fellow	USA	IITs Mandi, Assistant professor	India	IITs Mandi, professor	India	Indian
2010/7-2011/6	Yangzhou U., D. of Chem., Teacher	China	Yangzhou U., Coll. of Chem. & Chem. Eng., Associate professor	China	Yangzhou U., N/A	China	Chinese
2010/8-2011/7	U. of Washington, D. of Bioengineering, Postdoc fellow	USA	Stratos Genomics Inc., Scientist	USA	EY-Parthenon, Quantitative Strategy and Solutions,	USA	American
2010/8-2013/7	U. Tsukuba, PhD Candidate	Japan	Ulsan Natl. Inst. of S&T, Researcher	Korea	Wuhan U. of Tech., Professor	China	Chinese
2010/8-2013/7	Shanghai Inst. of Ceramics, CAS, PhD Candidate	China	Huazhong U. S&T, Sch. of Mat. S&T, Associate professor	China	Huazhong U. S&T, Professor	China	Chinese
2010/8-2014/4	U. Tsukuba, PhD Candidate	Japan	Soochow U., Coll. of Chem., Chem. Eng. & Mat. Sc.,	China	Soochow U., Coll. of Energy, Professor	China	Chinese
2010/8-2012/6	U. of Rome, PhD Candidate	Italy	Osaka U., Postdoc fellow	Japan	The U., of Sydney., Senior Research Fellow	Australia	Italian
2010/8-2011/3	U. Poitiers & Istanbul Tech. U., PhD Scholarship from French Gov.	Turkey	Istanbul Technical U., Research assistant	turkey	Istanbul Tech. U., D. of Chem., Associate professor	Turkey	Turkish
2010/8-2012/8	Nanyang Tech. U., Temasek Lab., Research assistant	Singapore	Nanyang Tech. U., Research fellow	Singapore			Indonesian
2010/9-2011/3	TIT, Postdoc fellow	Japan	Nanjing U. of S&T, Researcher	China			Chinese
2010/9-2012/3	Shivaji U., D. of Phys., PhD Candidate	India	The U. of Queensland, Postdoc fellow	Australia	CSIRO, Energy Business Unit, Senior research scientist	Australia	Indian
2010/9-2013/8	Inst. of Chem., CAS, PhD Candidate	China	Huazhong U. of S&T, Professor	China	Huazhong U. of S&T, Professor	China	Chinese
2010/9-2015/3	NIMS, Postdoc fellow	Japan	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan	Chinese
2010/9-2012/12	Heidelberg U., PhD Candidate	Germany	Vietnam Academy of S&T, Inst. Mat. Coresearcher	Vietnam			Vietnamese
2010/9-2012/6	Washington State U., Research assistant	USA	NIH, Maryland, NRC Research Associate	USA	CSIR-CGCRI, Kolkata, Principal scientist	India	Indian

2010/10-2013/6	Beihang U., PhD Candidate	China	NIMS, Postdoc fellow	Japan	Beihang U., Professor	China	Chinese
2010/10-2013/9	Inst. of Chem., CAS, PhD Candidate	China	NIMS, ICYS Researcher	Japan	Beijing Jiaotong U., Professor	China	Chinese
2010/10-2013/9	IOP, CAS, Beijing Lab. for Condensed Matter Phys.,	China	Meiji U., Postdoc fellow	Japan	Kyoto U., Associate professor	Japan	Chinese
2010/10-2012/10	Loughborough U., PhD Candidate	UK	NIMS, Postdoc fellow	Japan			Spanish
2010/11-2013/11	Charles U., D. of Macromolecular Phys., Research associate	Czech Republic	NIMS, Postdoc fellow	Japan	NIMS, Permanent researcher	Japan	Czech
2010/12-2012/4	Nagoya U., Postdoc fellow	Japan	Inst. of Proc. & Eng., CAS, Professor	China	Beijing U. of Chemical Technology, professor	China	Chinese
2011/1-2011/5	ETH-Zurich, Senior Scientist, Group leader	Switzerland	MIT, Senior scientist	USA	ETH Zurich, Professor	Switzerland	Swiss
2011/2-2011/5	Revolt Tech. Ltd., Chief Engineer	UK	Revolt Tech. Ltd., N/A	UK			German
2011/2-2013/1	French Atomic Energy Commission, Research engineer	France	Shiv Nadar U., D. of Phys., Assistant professor	India	Shiv Nadar U., Sch. of Natural Sci., Assistant professor	India	Indian
2011/4-2011/10	U. of S&T of China, PhD Candidate	China	Hefei U. of Tech., Professor	China	Shanghai Jiaotong U., Professor	China	Chinese
2011/4-2011/9	Peking U., PhD Candidate	China	Peking U., Assistant professor	China	Peking U., Associate Professor	China	Chinese
2011/4-2013/3	Ibaraki U., Postdoc fellow	Japan	Natl. Inst. of Tech., D. of Phys., Assistant professor	India	NITS, Assistant professor	India	Indian
2011/4-2014/1	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan	Lanzhou U., Sch. of Mat. & Ener., Professor	China	Chinese
2011/4-2014/6	Institute of Physics, Prague, Research assistant	Czech Republic	Institute of Physics, Prague, Optics D., Research assistant	Czech Republic			Russian
2011/5-2012/4	Korea Institute of S&T, Postdoc fellow	Korea	U. of Puerto Rico, Postdoc fellow	Puerto Rico			Indian
2011/5-2013/4	Shandong U., PhD Candidate	China	NIMS, Postdoc fellow	Japan	Shandong U., Associate professor	China	Chinese
2011/5-2013/5	Shaoxing U., Phys. D., Lecturer	China	Shaoxing U., Phys. D., Associate professor	China			Chinese

2011/6-2012/6	Warsaw U. of Tech., PhD Candidate	Poland	Warsaw U. of Tech., Researcher	Poland	Warsaw U. of Tech., Researcher	Poland	Polish
2011/7-2011/11	U. of Bristol, Royal Society U., Research fellow	UK	U. of Bristol, Assistant professor	UK			British
2011/7-2012/8	U. of Hong Kong, Research assistant	Hong Kong	U. of Sheffield, Sheffield Inst. for Translational Neuroscience,	UK			Hong-Kong
2011/9-2015/9	NIMS, JSPS fellow	Japan	Herbert Gleiter Inst. Nanoscience, Nanjing U. of S&T,	China			Chinese
2011/9-2013/8	IIS Bangalore, Research associate	India	IIS Bangalore, Research associate	India			Indian
2011/10-2013/2	East China Normal U., Graduate researcher	China	Melbourne Sch. of Eng.(MSE), U. of Melbourne, Research	Australia	East China Normal U., Researcher	China	Chinese
2011/10-2013/7	Hong Kong Product. Council, Mat. Tech. Div., Associate consultant	Hong Kong	Nano & Adv. Mat. Inst. Ltd., Assistant Technical Manager	China			Hong-Kong
2011/10-2014/9	Hunan U., PhD Candidate	China	Temple U., Assistant professor	USA	Jinan U., Associate professor	China	Chinese
2011/11-2013/10	Okayama U., PhD Candidate	Japan	NIMS, Postdoc fellow	Japan			Chinese
2011/11-2013/10	Katholieke U., Wim Dehaen Lab., Assistant Doctor	Belgium	U. of Southampton, Research fellow	UK			Belgian
2011/11-2013/3	U. of Rome, Vergata, PhD Candidate	Italy	St. Anne's U. Hospital Brno, Internatl. Clinical Res. C., Junior	Czech Republic			Italian
2011/11-2013/11	U. of Bordeaux, Physical-Chem., PhD Candidate	France	Erdyn Consultants, Consultant	France			French
2011/12-2012/11	GLOBALFOUNDRIES Singapore Pte. Ltd., Senior engineer	Singapore	Intellectual Property Office of Singapore, Officer	Singapore			Singaporean
2011/12-2013/8	Grenoble U., Inst. of Tech., Grenoble, PhD Candidate	France	Dongguk U., D. of Energy & Mat. Eng., Assistant professor	Korea			Chinese
2011/12-2014/1	U. of Oregon, Postdoc fellow	USA	IBN, Research scientist	Singapore	Kalasalingam U., C. Supramolecular Chem.,	India	Indian
2011/12-2015/2	NIMS, Postdoc fellow	Japan	Qatar Foundation, Senior scientist	Qatar	Hamid Bin Khalifa U., Qatar Env. & Energy Res. Inst.,	Qatar	Algerian
2011/12-2015/4	Saga U., PhD Candidate	Japan	NIMS, JSPS fellow	Japan	North Carolina Agricultural and Technical State U., Assistant	USA	Indian

2012/1-2012/12	Shanghai Jiao Tong U., Assistant researcher	China	Max Planck Inst. of Colloids & Interfaces, D. Colloid Chem.,	Germany	Shanghai Jiaotong U., Professor	China	Chinese
2012/1-2013/3	GIT., Sch. of Chem. & Biomolecular Eng., Postdoc fellow	USA	U. Tokyo, Assistant professor	Japan	NIMS, Permanent researcher	Japan	Thai
2012/4-2012/9	U. Rome, D. of Chem. S&T, PhD Candidate	Italy	U. of Liverpool, Research assistant	UK			Italian
2012/4-2013/12	Katholieke Universiteit Leuven, PhD Candidate	Belgium	Procter & Gamble, Administrative project assistant	Belgium			Belgian
2012/4-2014/11	U. Tsukuba, PhD Candidate	Japan	NIMS, JSPS fellow	Japan	Trinity Coll. Dublin, Group leader	Ireland	Iranian
2012/4-2014/6	NIMS, Postdoc fellow	Japan	NIMS, Independent Scientist (Permanent Position)	Japan	NIMS, Permanent researcher	Japan	Chinese
2012/4-2015/8	Natl. C. for Nanoscience and Tech. of China, N/A	China	Natl. C. for Nanoscience & Tech. of China, Assistant professor	China	Natl. C. for Nanoscience & Tech. of China, Associate professor	China	Chinese
2012/4-2019/7	NIMS, Postdoc fellow	Japan	SAL Silicon Austria Lab., Senior system scientist	Austria	SAL Silicon Austria Lab., Staff scientist	Austria	Vietnamese
2012/5-2013/6	Warsaw U. of Tech., Mat. Sci.& Eng., PhD Candidate	Poland	Warsaw U. of Tech., Research Fellow	Poland	MaterialsCare LLC, Researcher	Poland	Polish
2012/6-2014/5	Huazhong U. of S&T, Assistant professor	China	Hebei U. of Tech., Sch. of Mat. Sc. & Eng., Associate professor	China	Hebei U. of Tech., Mat. Sc. & Eng., Professor	China	Chinese
2012/8-2014/7	Flinders U., PhD Candidate	Australia	U. Nottingham, Postdoc fellow	UK	The U. of Queensland, Research enabler	Australia	Australian
2012/10-2013/7	Natl. Taiwan U., D. of Chem. Eng., Postdoc fellow	Taiwan	Natl. Taiwan U., Postdoc fellow	Taiwan	AIST, Researcher	Japan	Taiwanese
2012/10-2014/3	Korea U., PhD Candidate	Korea	Samsung Co., Ltd., Engineer	Korea			Korean
2012/10-2014/7	U. of Hyderabad, PhD Candidate	India	Bharathidasan U., DST-Inspire, Faculty member	India			Indian
2012/10-2016/8	NIMS, JSPS Fellow	Japan	Beijing Jiaotong U., Professor	China			Chinese
2012/11-2013/10	IOP, CAS, Postdoc fellow	China	Shandon U., Assistant researcher	China	Shandon U., Associate Professor	China	Chinese
2012/11-2014/10	Colorado State U., Postdoc fellow	USA	IITs Kanpur, D. of Chem., Postdoc fellow	India	Guru Nanak Inst. of Tech., Assistant professor	India	Indian

2012/11-2014/10	NIMS, Postdoc fellow	Japan	Beijing Inst. of Nanoenergy & Nanosystems, Postdoc fellow	China			Chinese
2012/11-2014/11	Nanjing U., Assistant professor	China	Nanjing U., Assistant professor	China	Nanjing U., Associate professor	China	Chinese
2012/11-2015/4	TIT, PhD Candidate	Japan	Private company, N/A	Japan			Chinese
2012/11-2015/9	Natl. U. Singapore, PhD Candidate	Singapore	Nanyang Tech. U., Postdoc fellow	China	Singapore Food Agency, Scientist	Singapore	Singaporean
2012/11-2013/10	U. Sydney, PhD Candidate	Australia	U. Sydney, Research associate	Australia			Chinese
2012/11-2013/5	U. Cambridge, Cavendish Lab., PhD Candidate	UK	Dongguk U., Research professor	Korea	Sun Yat-en U., Professor	China	Chinese
2013/1-2014/1	Inst. of Electrophysics, Natl. Chiao Tung U., Postdoc fellow	Taiwan	Natl. Chung-Hsing U., D. of Phys., Assistant professor	Taiwan	Natl. Chung-Hsing U., D. of Phys., Professor	Taiwan	Chinese
2013/1-2013/8	Natl. Taiwan U., Associate professor	Taiwan	Natl. Taiwan U., Associate professor	Taiwan	Natl. Taiwan U., Professor	Taiwan	Taiwanese
2013/2-2013/12	Fujian Inst. of Res. on Structure of Matter, CAS, Postdoc fellow	China	State U. New Jersey, Postdoc fellow	USA			Chinese
2013/2-2013/7	Dublin City U., Postdoc fellow	Ireland	Natl. Biophotonics & Imaging Platform Ireland, Technical	Ireland	SETU, Postdoctoral researcher	Ireland	Indian
2013/2-2013/8	U. of Bristol, EPSRC Adv. Research fellow	UK	U. Bath, D. of Chem., Researcher	UK			British
2013/2-2014/2	Budapest U. of Tech. & Economics, PhD Candidate	Hungary	CNRS, Postdoc fellow	France			Hungarian
2013/4-2013/6 2015/10-2017/3	Changchun Inst. Adv. Chem., Postdoc	China Japan	NIMS, JSPS Fellow NTU, Mat. Sc. & Eng., Postdoc	Japan Singapore			Chinese
2013/4-2014/3 2017/5-2019/6	Jadavpur U., PhD Candidate Sun Yat-Sen U., Postdoc fellow	India China	Bose Inst., Honorary researcher NIMS, Postdoc fellow	India Japan	Foundation of Physics Research Center (FoPRC), Postdoctoral	Italy	Indian
2013/4-2014/3	U. Montreal, Research assistant	Canada	BIOASTRA Technologies Inc., Platform leader	Canada			Polish
2013/4-2014/3	Waseda U., PhD Candidate	Japan	NIMS, ICYS researcher	Japan	Nanjing U., Professor	China	Chinese
2013/4-2015/3	U. Tokyo, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan	Tianjin U., N/A	China	Chinese

2013/4-2015/3	NIMS, Postdoc fellow	Japan	Natl. Inst. of Tech., Nagaland, Assistant professor	India	Natl. Inst. of Tech., Nagaland, Associate professor	India	Indian
2013/4-2015/9	U. Western Ontario, Postdoc fellow	Canada	NIMS, Postdoc fellow	Japan	Nanjing University of Aeronautics and Astronautics,	China	Chinese
2013/4-2016/3	Ningbo Inst. Mat. Tech.& Eng., Postdoc	China	Soochow U., Postdoc fellow	China	Ningbo Inst. Mat. Tech.& Eng., Researcher	China	Chinese
2013/4-2018/3	U. Tsukuba, Student	Japan	Hitachi High-Tech GLOBAL Corporation, Researcher	Japan			Korean
2013/5-2015/3	Hong Kong Polytechnic U., N/A	Hong Kong	Kansei Gakuin U., JSPS Fellow	Japan	Cardiff U., Sch. of Phys. & Astronomy, Lecturer	UK	Chinese
2013/5-2015/4	U. Groningen, PhD Candidate	Netherland	Natl. U. Singapore, D. of Phys., Research fellow	Singapore			Indonesian
2013/5-2017/6	Hanyang U., Research Assistant professor	Korea	NIMS, Postdoc fellow	Japan	SOBIN Institute LLC, President	Germany	Korean
2013/6-2015/8	U. Hong Kong, Postdoc fellow	Hong Kong	Harbin Inst. of Tech., Professor	China			Chinese
2013/9-2014/8	Soochow U., Inst. of Functional Nano & Soft Mat., Lecturer	China	Soochow U., Inst. of Functional Nano & Soft Mat., Lecturer	China	Soochow U., Inst. of Functional Nano & Soft Mat., Associate	China	Chinese
2013/9-2018/9	Helmholtz-Zentrum Berlin, Postdoc	Germany	U. Groningen, Research technician	Netherland	U. Groningen, Research Technician	Netherland	German
2013/9-2016/8 2017/3-2018/5	Freie U. Berlin, Postdoc fellow Freie U. Berlin, Humboldt Postdoc	Germany	Texas A&M U., Invited fellow NIMS, Postdoc fellow	USA Japan	Saigon HIGH-TECH PARK, Expert	Vietnam	Belgian
2013/9/1-2019/3/6	Waseda U., Student	Japan	East China Normal U., Researcher	China			Chinese
2013/10-2014/9	Hokkaido U., Postdoc fellow	Japan	Harima Chem. Industry, Researcher	Japan			Chinese
2013/10-2015/9	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan	SEMES, Senior engineer	Korea	Korean
2013/10/-2017/10	Shivaji U., Postdoc Fellow	India	CSIR-Central Electrochemical Res. Inst., Researcher	India	IITs Jammu, Associate professor	India	Indian
2013/10-2017/3	IACS, Research associate	India	NIMS, Postdoc fellow	Japan			Indian
2013/10-2017/6	Waseda U., PhD Candidate	Japan	Nanjing U., Eng. & Appl. Sc. D., Researcher	China	Nanjing U. of Aeronautics and Astronautics, professor	China	Chinese

2013/11-2014/12 2015/1-2017/12	U. Strasbourg, Postdoc fellow	France Japan	NIMS, ICYS Researcher Trinity Coll. Dublin, Research	Japan -	U. Montpellier, N/A	France	French
2014/1-2015/7	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan			Czech
2014/2-2016/7	U. Cambridge, Research associate	UK	U. Oxford, Glasstone research fellow	UK	U. Birmingham, Lecturer	UK	British
2014/2-2017/3	Institute Curie, Postdoc fellow	France	Aalto U., Sch. of S&T, Senior postdoc fellow	Finland	Aalto U., Research fellow	Finland	French
2013/12-2017/11	U. Würzburg, Humboldt fellow	Germany	Jinan U., Inst. of Photonics Tech., Professor	China	Jinan U., Inst. of Photonics Tech., Professor	China	Chinese
2014/3-2015/2	U. Cambridge, PhD Candidate	UK	Natl. Sun Yat-sen U., Assistant professor	Taiwan	Natl. Sun Yat-sen U., Professor	Taiwan	Taiwanese
2014/3-2016/3	DICP, S.K.L. Catalysis, PhD Candidate	China	Beijing Inst. of Tech., Associate professor	China			Chinese
2014/3-2017/2	IITs Kharagpur, PhD Candidate	India	Aalto U., Postdoc fellow	Finland	Aalto U., Research Fellow	Finland	Indian
2014/4-2014/9	U. Tokyo, Postdoc fellow	Japan	East China Normal U., Shanghai, Dept. of Phys.,	China	East China Normal U. Shanghai, D. of Phys., Associate professor	China	Chinese
2014/4-2015/3	Nagoya U., Postdoc fellow	Japan	BML Corporation, Engineer	Japan			Chinese
2014/4-2016/2	Natl. Inst. of Natural Sc., PhD Candidate	Japan	Huazhong U. of S&T, Associate professor	China			Chinese
2014/4-2018/3	Vellore Inst. of Tech., Postdoc fellow	India	VIT Bhopal U., Assistant professor	India	VIT Bhopal U., Assistant professor	India	Indian
2014/4-2016/11	Kwangju U., Postdoc fellow	Korea	Samsung Adv. Inst. of Tech., Researcher	Korea			Korean
2014/4-2017/3	IACS, PhD Candidate	India	Nanyang Tech. U., Sch. of Chem. & Biomedical Eng.,	Singapore			Indian
2014/4-2017/3	Waseda U., PhD Candidate	Japan	Bharathiar U., D. of Biotechnology, Assistant	India	Bharathiar U., D. of Biotechnology, Assistant	India	Indian
2014/4-2018/3	IOP of the Czech Academy of Sc., Postdoctoral fellow	Czech Republic	Micron Tech. Inc., Tech. D. Engineer	Japan	Lam RESEARCH, Senior process engineer	Belgium	Greek
2014/4-2018/6	U. Tsukuba, Student	Japan	NIMS, Postdoc fellow	Japan	Samsung electronics, Engineer	Korea	Korean

2014/4-2019/3	Shanghai Normal U., PhD Candidate	China	NIMS, Postdoc fellow	Japan			Chinese
2014/4-2019/3	U. Tsukuba, PhD Candidate	Japan	U. Tsukuba, Foreign Res. Fellow	Japan	Company, researcher	China	Chinese
2014/5-2014/12	U. Tsukuba, PhD Candidate	Japan	Soochow U., Associate professor	China	Soochow U., Professor	China	Chinese
2014/5-2015/1	U. Tokyo, Postdoc fellow	Japan	AIST, Postdoc fellow	Japan	Research Scientist, Ecole Polytechnique Federal de	Switzerland	French
2014/5-2016/4	Ajou U., Research assistant	Korea	Kyowa-chem. Industry, R&D d., Researcher	Japan			Vietnamese
2014/5-2016/8	IITs Kanpur, Research associate	India	International Inst. of Information Tech., Bangalore,	India	Manipal U. Jaipur., Assistant professor	India	Indian
2014/6-2015/7	Aarhus U., PhD Candidate	Denmark	Inst. for Molecular Medicine, Postdoc fellow	Denmark			Burmese
2014/6-2016/5	U. Grenoble, PhD Candidate	France	U. Tsukuba, Graduate Sch. of Pure & Appl. Sc., Assistant	Japan	Institut Des Materiaux Jean Rouxel - NANTES, PCM -	France	French
2014/6-2016/7	CSIR-Central Leather Res. Inst. Adyar, PhD Candidate	India	N/A				Indian
2014/6-2017/7	IACS Jadavpur, Postdoc fellow	India	HPCL, Green R&D C., Senior research officer	India			Indian
2014/7-2015/7	Western Kentucky U., N/A	USA	King Faisal U., Assistant professor	Saudi Arabia	King Faisal U., Associate professor	Saudi Arabia	Indian
2014/7-2017/3	Hokkaido U., PhD Candidate	Japan	Nanyang Tech. U., Sch. of Chem. & Biomedical Eng.,	Singapore	King Abdullah U. of S&T, N/A	Kingdom of Saudi Arabia	Chinese
2014/8-2015/4	Technical U. of Munich, Postdoc fellow	Germany	CSIR-Central Electrochemical Res. Inst., Scientist	India	CSIR-Central Electrochemical Res. Inst., Senior scientist	India	Indian
2014/8-2015/8	U. Houston, N/A	USA	U. Houston, Postdoc fellow	USA			Chinese
2014/9-2018/12	Waseda U., PhD Candidate	Japan	NIMS, Technical staff	Japan	Dalian Institute of Chemical Physics, CAS,	China	Pakistani
2014/10-2015/3 2021/3-2023/3	Kanazawa U., PhD Candidate U. Tsukuba, Researcher	Japan Japan	NIMS, Postdoc fellow NIMS, Postdoc fellow	Japan Japan	NIMS, Postdoc fellow	Japan	Chinese
2014/10-2019/3	TIT, PhD Candidate	Japan	Zhengzhou U., Professor	China	Zhengzhou U., Professor	China	Chinese

2014/10-2017/3	Hokkaido U., PhD Candidate	Japan	U. Sydney, Sch. of Phys., Research associate	Australia	Liaoning U. of Tech., Professor	China	Chinese
2014/11-2018/9	Inst. of Chem., Academia Sinica, Postdoc fellow	Taiwan	Coromandel International Ltd., Deputy Manager R6D	India	Maulana Abul Kalam Azad U. of Tech., Head of the Department	India	Indian
2014/11-2018/3 2021/4-2021/12	U. Wollongong, Res. assistant NIMS, ICYS Researcher	Australia Japan	NIMS, ICYS Researcher IM2NP, Permanent researcher	Japan France	CINaM, Researcher	France	Australian
2014/12-2016/11	Japan Adv. Inst. of S&T, Postdoc fellow	Japan	CSIR-Central E-chem. Res. Inst., DST INSPIRE Faculty	India	National Institute of Standards and Technology (NIST) ,	USA	Indian
2015/2-2017/1	Dalian U. of Tech., Postdoc fellow	China	Nagoya Institute of Tech., Postdoc fellow	Japan			Chinese
2015/2-2018/1	NIMS, Postdoc fellow	Japan	CORNES Technologies Ltd., Customer service engineer	Japan			French
2015/3-2015/11	NIMS, Postdoc fellow	Japan	Yamagata U., Assistant professor	Japan	Nagoya U., Designated assistant professor	Japan	German
2015/4-2015/12	AIST, Postdoc fellow	Japan	Sumitomo Seika Chem. Co., Ltd., N/A	Japan			Chinese
2015/4-2018/3	AIST, Postdoc fellow	Japan	NIMS, Permanent researcher	Japan	NIMS, Permanent researcher	Japan	Rumanian
2015/4-2017/3	Nanyang Tech. U., & CREATE, Research staff	Singapore	N/A				Indian
2015/4-2017/3	Tokyo U. of Sc., JSPS Fellow	Japan	NIMS, Postdoc fellow	Japan	U. Tokyo, Researcher	Japan	Nepalese
2015/4-2018/3	U. Tsukuba, Student	Japan	Micron Memory Japan, Research engineer	Japan			Chinese
2015/4-2018/3	China Jiliang U., Student	China	AIST, Postdoc Fellow	Japan	AIST, Postdoc Fellow	Japan	Chinese
2015/4-2023/9	U. Tsukuba, PhD Candidate	Japan	AIST Chubu, Postdoc fellow	Japan	AIST Chubu, Postdoc fellow	Japan	Indonesian
2015/5-2018/4	AIST, Postdoc fellow	Japan	U. Tsukuba, Researcher	Japan	U. Tsukuba, Assistant Professor	Japan	Vietnamese
2015/5-2019/3	Hokkaido U. PhD Candidate	Japan	NIMS, Postdoc fellow	Japan	NIMS, JSPS fellow	Japan	Chinese
2015/5-2017/5	U. St Andrews, Sch. of Chem., Visiting scholar	UK	Ruhr-U. Bochum, Humboldt Postdoc fellow	Germany	North China Electric Power U., Professor	China	Chinese

2015/7-2017/12	Nanjing U. of S&T, Postdoc fellow	China	NIMS, JSPS Fellow	Japan	Nanjing U. of S&T, Professor	China	Chinese
2015/8-2016/11	King Abdullah U. of S&T, Postdoc fellow	Saudi Arabia	Chalmers U. of Tech., Researcher	Sweden	Kuwait Coll. of S&T, N/A	Kuwait	Indian
2015/8-2017/3	NIMS, Postdoc fellow	Japan	AIST, Postdoc fellow	Japan			Egyptian
2015/8-2017/8	Hebei U. of Tech., PhD Candidate	China	Hebei U. of Tech., Researcher	China			Chinese
2015/9 -2016/1	Flinders U., Postdoc fellow	Australia	Flinders U., Sch. of Medicine, Postdoc fellow	Australia			Australian
2015/9-2018/8	Waseda U., Student	Japan	South-Central U. for Nationalities, lecturer	China			Chinese
2015/9-2017/8	Kyushu U., Postdoc fellow	Japan	Fujian Inst. of Res. on the Structure of Matter, Professor	China			Chinese
2015/10-2016/9	CAS, Postdoc fellow	China	Nanyang Tech. U., N/A	Singapore			Chinese
2015/10-2017/2	Natl. Korea Maritime & Ocean U. PhD Candidate	Korea	Nanometrics Co., Ltd., Application Scientist	Korea			Korean
2015/10-2017/3	Tokyo Metropolitan U. PhD Candidate	Japan	Fuzho U., D. of Biological Eng., Associate professor	China	Fuzho U., D. of Biological Eng., Associate professor	China	Chinese
2015/10-2017/3	NIMS, Postdoc Fellow	Japan	North China U. of S&T, Associate professor	China	North China U. of S&T, professor	China	Chinese
2015/10-2017/10	Charles U., Prague, D. Surface & Plasma Sc., Postdoc fellow	Czech Republic	Jabil Inc., Manufacturing engineer	Ukraine			Ukrainian
2015/11-2017/3	Tsinghua U., PhD Candidate	China	Beijing Inst. of Tech., D. Mat. Phys. Chem., Assistant	China	Beijing Inst. of Tech., D. Mat. Phys. Chem., Assistant	China	Chinese
2015/11-2019/7	Natl. Taiwan U., Postdoc fellow	Taiwan	Renewable Energy Corporation, REC Solar, Principal engineer	Singapore	Renewable Energy Corporation, REC Solar, Principal engineer	Singapore	Indian
2015/11/-2019/11	Changchun Inst. of Appl. Chem., Associate professor	China	Tianjin U., Professor	China	Tianjin U., Professor	China	Chinese
2015/11-2017/11	HEFCE, Bristol, Higher Education Policy Advisor	UK	NIMS, Postdoc fellow	Japan			British
2016/3-2017/3	IISER Bhopal, PhD Candidate	India	Clemson U., Postdoc fellow	USA	APC Ltd., N/A	Ireland	Indian

2016/4-2017/3	IACS, Center for Adv. Mat., Researcher	India	Jogamaya Devi Coll., Kolkata, Assistant professor	India			Indian
2016/4-2017/3	NIMS, Postdoc fellow	Japan	IFW Dresden, Postdoc fellow	Germany	Hunan U., Coll. of Mat. Sc. & Eng., Professor	China	Chinese
2016/4-2017/3	Hokkaido U., PhD Candidate	Japan	NIMS, Postdoc fellow	Japan			Chinese
2016/4-2017/7	NIMS, Postdoc fellow	Japan	Mindanao State U. Iligan Inst. of Tech., Professor	Philippine	Mindanao State U. Iligan Inst. of Tech., Professor	Philippine	Filipino
2016/4-2018/3	U. Tsukuba, Student	Japan	CM Plus Corporation, Process engineer	Japan			Indonesian
2016/4-2019/3	U. Tsukuba, PhD Candidate	Japan	U. Lahore, Assistant professor	Pakistan	U. of Education, Assistant professor	Pakistan	Pakistani
2016/4-2019/3	Waseda U., PhD Candidate	Japan	East China Normal U., Researcher	China			Chinese
2016/4-2020/3	Kyushu U., Student	Japan	NIMS, Postdoc fellow	Japan	Faculty of Eng. Phy. of Hanoi U. of S&T, Lecturer	Vietnam	Vietnamese
2016/5-2018/5	Institute of Jean Lamour, Postdoc fellow	France	ICMCB, Postdoc fellow	France			French
2016/6-2019/8	Georgia Inst. of Tech., PhD Candidate	USA	Mitsubishi Chem. Co., Ltd., N/A	Japan	Mitsubishi Chem. Co., Ltd., N/A	Japan	Indian
2016/9-2018/6	Waseda U., Student	Japan	NIMS, JSPS fellow	Japan			Chinese
2016/9-2020/9/30	NIMS, JSPS researcher	Japan	NIMS, Visiting researcher	Japan	U. of Queensland, the Australian Inst. for Bioengineering &	Australia	Australian
2016/10-2017/3	NIMS, JSPS Fellow	Japan	Northwestern U., D. of Biomedical Eng., Postdoc fellow	USA	Northwestern U., D. of Biomedical Eng., Research	USA	Chinese
2016/10-2017/6	Durham U., PhD Candidate	UK	Korea Basic Sc. Institute, Senior researcher	Korea	Korea Basic Sc. Institute, Senior researcher	Korea	Korean
2016/10-2017/9	Khalifa U., Lecturer	UAE	Intel Corporation, Yield Engineer	Ireland	GlobalFoundries, Team Lead in Device Technology,	Bulgaria	Irish
2016/10-2018/6	Huazhong U. of S&T, Mat. Sc., PhD Candidate	China	KIOXIA Corporation, Researcher	Japan	Huawei Japan, N/A	Japan	Chinese
2016/10-2018/10	U. of Reading, PhD Candidate	UK	CHRISMAT, Postdoc fellow	France			French

2016/10-2017/5	CNRS Thales, Research associate	France	Ningbo Inst. of Mat. Tech. Eng., Researcher & Team leader	China	Ningbo Inst. of Mat. Tech. Eng., Team Leader	China	Chinese
2017/3-2019/12	MIT, Postdoc fellow	USA	JCNS F. Julich GmbH, Research software Engineer	Germany	JCNS F. Julich GmbH, Research software Engineer	Germany	British
2017/3-2018/11	Natl. U. of Singapore, Research staff	Singapore	NIMS, ICYS researcher	Japan	Southeast U., Professor	China	Chinese
2017/3-2019/9	U. Wien, Guest scientist	Austria	Inst. of Tech. Bandung, Math. & Natural Sc., Research staff	Indonesia	Inst. of Tech. Bandung, Lecturer	Indonesia	Indonesian
2017/4-2018/2	U. Wollongong, PhD Candidate	Australia	Tech. U. Berlin/ U. Potsdam, Humboldt Postdoc fellow	Germany			Australian
2017/4-2021/8	Kyushu U., PhD Candidate	Japan	Saint-Gobain, N/A	Japan			Indonesian
2017/7-2019/3	SPINTEC Grenoble, Postdoc fellow	France	TII, Assistant professor	Japan	U. Osaka, Assistant professor	Japan	Russian
2017/10-2018/6	U. Tsukuba, Student	Japan	GREMAN, Postdoc researcher	France			French
2017/10-2019/3	IACS, Mat. Sc., Postdoc fellow	India	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan	Indian
2017/10-2019/9	Hong Kong Polytechnic U., Research associate	China	South China Normal U., Professor	China	South China Normal U., Professor	China	Chinese
2017/11-2020/3	U. Tokyo, PhD Candidate	Japan	U. Oxford, Postdoc fellow	UK	Imperial College London, Postdoctoral research associate	UK	Chinese
2017/11-2018/4	Liaocheng U., Associate professor	China	Liaocheng U., Professor	China			Chinese
2017/11-2020/9	Vellore Inst. of Tech., Assistant professor	India	ASM Japan K.K., Engineer	Japan			Indian
2017/11-2019/11	Concept Life Sc. Chapel-en-le-Frith, Employee	UK	NIMS, ICYS fellow	Japan	The Open U., Lecturer	UK	British
2018/2-2020/2	NIMS, JSPS Fellow	Japan	Kyoto U., Specific researcher	Japan	Kyoto U., Specific researcher	Japan	Indian
2018/3-2021/10	Kyungpook Natl. U., PhD Candidate	Korea	National U. of S&T, Assistant professor	Pakistan	National U. of S&T, Assistant professor	Pakistan	Pakistani
2018/3-2019/2	Nanjing U., Master degree candidate	China	King Abdullah U. of Sc., PhD student	Saudi Arabia			Chinese

2018/5-2020/3	U. Tokyo, PhD Candidate	Japan	N/A		Changsha U. of S&T, Assistant professor	China	Chinese
2018/5-2019/3	CAS, Postdoc fellow	China	Trivenidevi Bhalotia Coll., Assistant professor	India	Trivenidevi Bhalotia Coll., Assistant professor	India	Indian
2018/6-2020/3	Kumamoto U., Inst. of Pulsed Power Sc., Assistant professor	Japan	Iwate U., Postdoctoral fellow	Japan	Iwate U., Postdoctoral fellow	Japan	French
2018/6-2020/3 2020/12-2022/12	Urmia U., PhD Candidate	Iran	Koc U., Researcher	Turkey	Istinye University, Senior Research Fellow	Turkey	Iranian
2018/7-2019/8	Natl. Cheng Kung U., PhD Candidate	Taiwan	ITRI, C. for Measurement Stand, Researcher	Taiwan	ITRI, Center for Measurement Stand, Researcher	Taiwan	Taiwanese
2018/10-2019/3	U. Tokyo, PhD Candidate	Japan	CSIRO Land and Water, Postdoc fellow	Australia	NIMS, Permanent researcher	Japan	Chinese
2018/10-2020/1	Jilin U., PhD Candidate	China	Jilin U., Assistant professor	China	Jilin U., Assistant professor	China	Chinese
2018/11-2020/3	U. Washington, PhD Candidate	USA	U. Washington, Medical Intern	USA	U. Washington, Medical Intern	USA	American
2019/4-2019/11	Indian Inst. of Sc., Researcher	India	U. Calabria, PhD Scholar	Italy	Italian Institute of Technology, Postdoc researcher	Italy	Indian
2015/4-2020/4	IIS, PhD Candidate	India	U. Tsukuba, Postdoc fellow	Japan	Indian Institute of Technology Hyderabad, Assistant professor	India	Indian
2016/3-2020/11	U. of Waterloo, PhD Candidate	Canada	Hubei U., Associate professor	China	Hubei U., Associate professor	China	Chinese
2016/10 -2023/3	Hokkaido U., PhD Candidate	Japan	Tianjing U., Associate professor	China	Tianjing U., Associate professor	China	Chinese
2017/6-2020/10 2021/1-2021/3	Nanjing u. of aeronautics and astronautics, PhD Candidate NIMS, JSPS fellow	China Japan	NIMS, Postdoc fellow N/A	Japan	U. of Queensland, DECRA Research fellow	Australia	Chinese
2017/10-2020/9	Nanjing U., PhD Candidate	China	Southeast U., Assistant professor	China			Chinese
2017/10-2021/3	IITs, PhD Candidate	India	U. of Southampton, Postdoc fellow	UK	U. of Kent, Canterbury, Dep. of Chem., Assistant Professor	UK	Indian
2017/11-2020/5	Leibniz Institute for Solid State and Materials Research Dresden	Germany	NA		Sun Yat-Sen U., Associate professor	China	Chinese
2017/11-2022/4	Kyushu U., Student	Japan	UTM, Senior lecturer		Infineon, Senior staff engineer	Malaysia	Malaysia

2021/10-2022/3	NIMS, ICYS research fellow	Japan	National Taiwan U., Postdoc fellow	Taiwan	National Sun Yat-sen U., Dep. of Mat. and Optoelectronic Scie.,	Taiwan	Taiwanese
2018/2-2021/1	Indian Institute of Technology, Kanpur, PhD Candidate	India	Indian Institute of Technology BHU, Postdoc researcher	India	IIT-BHU, National-Post doctoral fellow	India	Indian
2018/3-2020/4	U. Houston, Postdoc fellow	USA	Sun Yet-sen U., Assistant professor	China	Sun Yet-sen U., N/A	China	Chinese
2018/4-2023/3	U. Tsukuba, PhD Candidate	Japan	Zhuhai College of Science and Technology, N/A	China			Chinese
2018/7-2021/4	Nanjing U. of Aeronautics and Astronautics, N/A	China	Nanjing U. of Aeronautics and Astronautics, Lecturer	China	Nanjing U. of Aeronautics and Astronautics, Associate	China	Chinese
2018/10-2024/3	Hokkaido U., PhD Candidate	Japan	N/A				Chinese
2018/11-2020/10	The U. of Central Florida, Postdoc fellow	USA	Ningbo U., Researcher	China	Ningbo U., Professor	China	Chinese
2018/11-2020/12	Universite de Rennes 1, PhD Candidate	France	CNRS, Postdoc fellow	France			French
2018/12-2022/10	Université Lille 1, PhD Candidate	France	N/A				Spanish
2018/12-2022/11	Nanjing U. of Aeronautics and Astronautics, Assistant professor	China	Zhengzhou U., Professor	China	Zhengzhou U., Professor	China	Chinese
2018/12-2022/7	Dalian Inst. of Chem. Phys., CAS, PhD Candidate	China	Sun Yat-sen U., Associate professor	China	Sun Yat-sen U., Associate professor	China	Chinese
2018/12-2021/7	U. Houston, Postdoc fellow	USA	Harbin Inst. of Tech., Professor	China	Harbin Inst. of Tech., Professor	China	Chinese
2019/1-2022/3	Tohoku U., Postdoc fellow	Japan	NIMS, ICYS research fellow	Japan	NIMS, ICYS research fellow	Japan	French
2019/2-2020/9	Queen Mary U. London, Teaching fellow	UK	Queen Mary U. London, Postdoc fellow	UK			British
2021/5-2023/4	Queen Mary U. London, Postdoc fellow	UK	N/A				
2019/3-2020/3	IIT Guwahati, PhD Candidate	India	NIMS, JSPS fellow	Japan	U. of Arkansas, Postdoc fellow	USA	Indian
2020/10-2023/3	NIMS, Postdoc fellow	Japan	U. of Arkansas, Postdoc fellow	USA			
2019/4-2020/9	U. Konstaz, Engineer	Germany	Tokyo Electron, Engineer	Japan	Tokyo Electron, Senior specialist	Japan	Indian

2019/4-2020/11	Regional Centre of Advanced Technologies and Materials, Postdoc	Czech	Institute of Minerals & Materials Technology (IMMT), Scientist	India			Indian
2019/4-2020/11	IACS, N/A	India	Achhruram Memorial Coll., Assistant professor	India	Achhruram Memorial Coll., Assistant professor	India	Indian
2019/4-2021/7	Guangdong U. of Technology, Postdoc fellow	China	Harbin Inst. of Tech., Assistant professor	China	Harbin Inst. of Tech., Assistant professor	China	Chinese
2019/4-2021/4 2021/10-2022/4	Queen Mary, U. London(QMUL), Academic visitor	UK	NIMS, Postdoc fellow	Japan	IITs Madras, Assitant professor	India	Indian
	NIMS, JSPS fellow	Japan	IITs Madras, Assitant professor	India			
2019/5-2021/5	Normandy U., Postdoc fellow → U. of Caen Normandy	France	Entreprise Confidentielle, Research engineer	France	Entreprise Confidentielle, Research engineer	France	French
2019/7-2021/6	Nanjing U. of Posts and Telecommunications, Lecturer	China	Nanjing U. of Posts and Telecommunications, Lecturer	China			Chinese
2019/10-2020/12	Hokkaido U., PhD Candidate	Japan	Palack U., Postdoc fellow	Czech Republic	U. of Calgary, Post doctoral researcher	Canada	Indian
2017/10-2020/6	The Ohio State U., Postdoc fellow	USA	Sun Yat-sen U., Professor	China	Sun Yat-sen University, Professor	China	Chinese
2019/10-2020/9	U. of S&T of China, Research assistant	China	Nagoya U., Postdoc fellow	Japan	Nagoya U., Specially appointed professor	Japan	Chinese
2019/10-2021/9	Czech Academy of Sc., N/A	Czech Republic	Inst. of Inorganic Chem. of the CAS, Researcher	Czech Republic	Inst. of Inorganic Chem. of the CAS, Postdoctoral Researcher	Czech Republic	Czech
2019/10-2021/3	IITs Indore, Postdoc fellow	India	Université de Rennes, Postdoc fellow	France	North Dakota State U., Postdoc fellow	USA	Indian
2019/11-2023/3	Hohai U., Associate professor	China	Zhejiang Ocean U., Professor	China	Zhejiang Ocean U., Professor	China	Chinese
2019/12-2022/7	Autonomous U. of Madrid, PhD Researcher	Spain	Autonomous U. of Madrid, Postdoc fellow	Spain	Autonomous U. of Madrid, Assistant Professor	Spain	Spanish
2020/1-2020/6	NCKU, Center of Appl. Nanomedicine, Postdoc fellow	Taiwan	Kaohsiung Medical U., Assistant professor	Taiwan	Kaohsiung Medical U., Assistant professor	Taiwan	Taiwanese
2020/1-2020/12	U. of Birmingham, Postdoc fellow Shenzhen U., Postdoc fellow	UK China	NA				Chinese
2020/2-2023/8	Charles U., Scientific researcher	Czech Republic	Inst. of Physics of the Czech Academy of Sciences, Postdoc	Czech Republic			Czech
2020/2-2023/4	Indian Institute of Technology, Student	India	N/A		Max Planck Institute for Polymer Research, Humboldt	Germany	Indian

2020/2-2021/3	Iowa State U., Graduate student researcher	USA	Crystal IS, Senior R&D Engineer	USA	Crystal IS, Senior R&D Engineer	USA	American
2020/3-2021/2	Atomic Energy and Alternative Energies Commission (CEA),	France	Chervy-Chaker Biotech, Chief Scientific officer	France			Morocco
2020/4-2020/12	U. Tsukuba, PhD Candidate	Japan	AIST, Postdoc fellow	Japan	AIST, Postdoc researcher	Japan	Austria
2020/4-2021/3	Hokkaido U., PhD Candidate	Japan	N/A		Gnanamani College of Tech., Namakkal, India, Dep. of Bio.,	India	Indian
2020/5-2021/3	CNRS, Postdoc fellow	France	NIMS, JSPS fellow	Japan			Australian
2020/5-2022/12	U. Tokyo, PhD Candidate	Japan	U. of Bristol, Newton International fellow	UK	U. of Bristol, Newton International fellow	UK	Indian
2020/7-2021/12	IIOIR, Senior scientist	India	IIOIR, Research director in Chem.	India	Foundation of Physics Research Center (FoPRC), Postdoctoral	Italy	Indian
2020/8-2023/3	Southeast U., PhD Candidate	China	NIMS, Postdoc fellow	Japan	U. of South China, Professor	China	Chinese
2020/12-2021/11	Hiroshima U., PhD Candidate	Japan	NA		Weichai Power Co., Ltd., Researcher	China	Chinese
2020/12-2022/12	U. Queensland, Researcher	Australia	Shahjalal U. of S&T, Researcher	Bangladesh	U. of Queensland, the Australian Inst. for Bioengineering &	Australia	Bangladesh
2021/1-2023/5	U. of Technology Sydney, Research Associate	Australia	Hubei U., Specially appointed associate researcher	China	Hubei U., Specially appointed associate researcher	China	Chinese
2021/1-2023/3	Yonsei U., N/A	Korea	Donghua U., Specially- hired researcher	China	Donghua U., Researcher	China	Chinese
2021/3-2023/3	CEA, Grenoble	France	U. of Illinois Chicago, Postdoctoral fellow	USA	U. of Illinois Chicago, Postdoctoral fellow	USA	Indian
2021/4-2023/3	Waseda U., PhD Candidate	Japan	Nagoya U., Assistant professor	Japan	Nagoya U., Assistant professor	Japan	Saudi Arabia
2021/4-2021/8	U. of Oregon, Graduate teaching fellow	USA	NA				American
2021/5-2023/3	NIMS, JSPS fellow	Japan	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan	Egyptian
2021/5-2022/9	French Alternative Energies and Atomic Energy Commission, Valduc	France	CNRS, Research fellow	France	CNRS, Research fellow	France	French

2021/7-2023/3	U. Tsukuba, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan	Indian
2021/10-2022/10	U. Tokyo, PhD Candidate	Japan	Micron Technology, Inc., Analysis engineer	USA	Micron Technology, Inc., Analysis engineer	USA	American
2021/11-2022/10	Kanazawa U., Postdoc fellow	Japan	Inst. Teknologi Sepuluh Nopember, Assistant professor	Indonesia	Inst. Teknologi Sepuluh Nopember, Assistant professor	Indonesia	Indonesian
2022/1-2022/2	Hokkaido U., PhD Candidate	Japan	Osaka U., ISIR, Postdoc fellow	Japan	Osaka U., ISIR, Postdoc fellow	Japan	Chinese
2022/2-2022/11	U. Tokyo, Postdoc fellow	Japan	U. Tokyo, Project researcher	Japan	U. Tokyo, Researcher	Japan	Filipino
2022/4-2023/3	Beni-Suef U., N/A	Egypt	Beni-Suef U., Assistant professor	Egypt	Beni-Suef U., Assistant professor	Egypt	Egyptian
2022/4-2023/3	U. Tsukuba , PhD Candidate	Japan	Tokyo Electoron Miyagii, Staff	Japan	Tokyo Electoron Miyagii, N/A	Japan	Chinese
2022/4-2023/3	Nagoya U., Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan	NIMS, Postdoc fellow	Japan	Vietnamese
2022/4-2023/1	Tohoku U., PhD Candidate	Japan	Tsinghua U., Postdoc fellow	China	Tsinghua U., Postdoc fellow	China	Chinese
2022/10-2023/3	U. Tokyo, PhD Candidate	Japan	Kyushu U., Postdoc fellow	Japan	Kyushu U., Postdoc fellow	Japan	Chinese
2015/10-2024/2	U. Tsukuba, PhD Candidate	Japan	Dexerials Corporation, N/A	Japan	Dexerials Corporation, N/A	Japan	Chinese
2022/4-2023/6	Shibaura Inst. of Technology, Postdoc fellow	Japan	Guilin U. of Electronic Technology, Professor	China	Guilin U. of Electronic Technology, Professor	China	Chinese
2021/5-2023/9	Tanta U., Associate professor	Egypt	Tanta U., N/A	Egypt	Tanta U., Associate professor	Egypt	Egyptian
2022/5-2024/3	Beni- Suef U., Associate professor	Egypt	Beni-Suef U., N/A	Egypt	Beni-Suef U., Associate Professor	Egypt	Egyptian
2022/6-2023/7	Yonsei U., Postdoc researcher	Korea	U. Tsukuba, Postdoc researcher	Japan	Amity U., Dep. of Chem., Assistant professor	India	Indian
2022/7-2023/7	Tokyo Metropolitan U., PhD Candidate	Japan	Tokyo Inst. of Tech., Postdoc researcher	Japan	Tokyo Metropolitan U., Postdoctoral researcher	Japan	Indian
2022/7-2023/8	Montpellier and Toulouse Universities, PhD Candidate	France	Saint-Gobain PAM Canalisation, R&D engineer	France	Saint-Gobain PAM Canalisation, R&D engineer	France	French

2023/10-2023/12	Waseda U., PhD Candidate	Japan	Yamanashi U., Postdoc fellow	Japan	Yamanashi U., Postdoc fellow	Japan	Chinese
2021/11-2024/3	Kyungpook National U., Research professor	Korea	Montpellier U., N/A	France	Montpellier U., N/A	France	Bangladesh
2021/11-2023/11	U. of Chem. and Tech. Prague, PhD Candidate	Czech Republic	Center for Electrochemistry and Surface Technology (CEST) ,	Austria	Center for Electrochemistry and Surface Technology (CEST) ,	Austria	Russian
2022/10-2024/3	Hokkaido U., PhD Candidate	Japan	National Research and Innovation Agency (BRIN),	Indonesia	National Research and Innovation Agency (BRIN),	Indonesia	Indonesian
2020/8-2024/3	Tokyo Metropolitan U., Postdoc fellow	Japan	U. of Texas, Research associate	USA	U. of Texas, Research associate	USA	Indian
2022/10-2023/10	U. Insubria, Postdoc	Italy	John Wiley & Sons, Inc., Assistant Editor	India	John Wiley & Sons, Inc., Assistant Editor	India	Indian
2023/10-2024/3	Hokkaido U., PhD Candidate	Japan	N/A				Chinese
2023/4-2024/3	Nagoya U., PhD Candidate	Japan	Company, N/A	China	Company, N/A	China	Chinese
2021/7-2024/3	AIST, Miyagi, Postdoctoral researcher	Japan	U. Tokyo, Assistant professor	Japan	U. Tokyo, Assistant professor	Japan	Belgian
2024/2-2024/3	U. Tsukuba, PhD Candidate	Japan	Kafrelsheikh U., Assistant lecturer	Egypt	Kafrelsheikh U., Assistant lecturer	Egypt	Egyptian

Project Expenditures FY2023

(Thousand yens)

	Amount	Details	Operational subsidies to National University Corporations(Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others	
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details
Personnel	1,263,123	Operational subsidies to National University Corporations(Incorporated Administrative Agency	16,225	Center director 1														
	10,170	Funding by WPI Academy	14,472	Administrative direct 1														
	39,208	Government Subsidies except Funding from WPI Academy	-	Principal investigator 0	-	Principal investigator 0	-	0	-	0	-	0	-	0	-	0	-	0
	3,530	Donations		・Full-time/Japanese		・Full-time/Japanese												
	-	Indirect funding		・Concurrent/Japanese		・Concurrent/Japanese												
	54,749	Joint research projects		・Full-time/Overseas		・Full-time/Overseas												
	158,836	Competitive funding		・Concurrent/Overseas		・Concurrent/Overseas												
	-	Others	1,014,298	Other researchers 91	-	Other researchers 0	-	Other researchers 0	1,931	Other researchers 1	-	0	-	Other researchers 0	47,741	Other researchers 9	-	0
			1,014,298	・Associate professor /Assistant professor		・Associate professor /Assistant professor									47,741	・Others 9		
				・Others 91		・Others			1,931	・Others 1								
Subtotal	1,529,616		1,263,123	187	10,170	2	39,208	18	3,530	3	-	0	54,749	17	158,836	54	-	0
Project activities	188,048	Operational subsidies to National University Corporations(Incorporated Administrative Agency	110,304	Cost of consumables 767	Cost of consumables 260	Cost of consumables 2,970	Cost of consumables 496	Cost of consumables 2,970	Cost of consumables 496				17,965	Cost of consumables 829	51,078	Cost of consumables 829		
	11,669	Funding by WPI Academy	17,068	Information terminal 129	Information terminal 2,288	Information terminal 496	Information terminal 496	Information terminal 496	Information terminal 496				2,525	Information terminal 829	13,728	Information terminal 829		
	2,548	Government Subsidies except Funding from WPI Academy	7,550	Cost of temporary workers 6,585	Cost of temporary workers 979	Cost of temporary workers 979	Cost of temporary workers 979	Cost of temporary workers 979	Cost of temporary workers 979				8,301	Cost of temporary workers 643	24,020	Cost of temporary workers 643		
	4,850	Donations	3,854	honorarium 35,528	honorarium 979	honorarium 979	honorarium 979	honorarium 979	honorarium 979				330	honorarium 17,082	643	honorarium 17,082		
	-	Indirect funding	35,528	Maintenance and repair 12,315	Maintenance and repair 9	Maintenance and repair 9	Maintenance and repair 9	Maintenance and repair 9	Maintenance and repair 9				4,361	Maintenance and repair 2,049	17,082	Maintenance and repair 2,049		
	34,867	Joint research projects	12,315	Communication and transport 665	Communication and transport 2,870	Communication and transport 2,870	Communication and transport 2,870	Communication and transport 2,870	Communication and transport 2,870				1,385	Communication and transport 1,145	2,049	Communication and transport 1,145		
	96,846	Competitive funding	665	Advertisement 764	Advertisement 330	Advertisement 330	Advertisement 330	Advertisement 330	Advertisement 330									
	-	Others	764	conference (sympodium) Others	conference 330	conference 330	conference 330	conference 330	conference 330									
	Subtotal	338,828		188,048	11,669	2,548	4,850	-	-	-	-	-	34,867	96,846	-	-	-	-
Travel	35,535	Operational subsidies to National University Corporations(Incorporated Administrative Agency	15,821	Overseas travel costs 643	Overseas travel costs 1,002	Overseas travel costs 1,712	Overseas travel costs 385	Overseas travel costs 1,712	Overseas travel costs 385				11,667	Overseas travel costs 20,805	20,805	Overseas travel costs 20,805		
	5,795	Funding by WPI Academy	17,646	Domestic travel costs 4,791	Domestic travel costs 42	Domestic travel costs 42	Domestic travel costs 42	Domestic travel costs 42	Domestic travel costs 42				5,591	Domestic travel costs 4,521	5,591	Domestic travel costs 4,521		
	1,044	Government Subsidies except Funding from WPI Academy	2,068	Accommodation 361	Accommodation 361	Accommodation 361	Accommodation 361	Accommodation 361	Accommodation 361				780	Accommodation 780		Accommodation 780		
	2,097	Donations																
	-	Indirect funding																
	18,038	Joint research projects																
	25,326	Competitive funding																
	-	Others																
	Subtotal	87,835		35,535	5,795	1,044	2,097	-	-	-	-	-	18,038	25,326	-	-	-	-
Equipment	-	Operational subsidies to National University Corporations(Incorporated Administrative Agency																
	-	Funding by WPI Academy																
	-	Government Subsidies except Funding from WPI Academy																
	-	Donations																
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
	Subtotal	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Research projects	118,430	Operational subsidies to National University Corporations(Incorporated Administrative Agency	23,488	Research material 7,089	Research material 144	Research material 1,165	Research material 253	Research material 1,165	Research material 253				7,363	Research material 13,728	13,728	Research material 13,728		
	655	Funding by WPI Academy	10,988	Outsourcing 1,115	Outsourcing 1	Outsourcing 1	Outsourcing 1	Outsourcing 1	Outsourcing 1				5,936	Outsourcing 5,153	5,153	Outsourcing 5,153		
	19,791	Government Subsidies except Funding from WPI Academy	10,988	Book 6,457	Book 1	Book 1	Book 1	Book 1	Book 1				302	Book 2,658	2,658	Book 2,658		
	4,312	Donations	1,115	Academic association fee registration fee 32,103	Academic association fee registration fee 154	Academic association fee registration fee 154	Academic association fee registration fee 154	Academic association fee registration fee 154	Academic association fee registration fee 154				182	Academic association fee registration fee 13,253	13,253	Academic association fee registration fee 13,253		
	-	Indirect funding	6,457	Non-asset goods rental fee 2,253	Non-asset goods rental fee 66	Non-asset goods rental fee 66	Non-asset goods rental fee 66	Non-asset goods rental fee 66	Non-asset goods rental fee 66				876	Non-asset goods 112	112	Non-asset goods 112		
	26,157	Joint research projects	32,103	utility charge 34,606	utility charge 12,901	utility charge 12,901	utility charge 12,901	utility charge 12,901	utility charge 12,901				5,151	Non-asset goods 2,505	2,505	Non-asset goods 2,505		
	67,366	Competitive funding	331	internal utility charge Metal reforming etc 655	internal utility charge Metal reforming etc 655	internal utility charge Metal reforming etc 655	internal utility charge Metal reforming etc 655	internal utility charge Metal reforming etc 655	internal utility charge Metal reforming etc 655									
	-	Others	2,253															
			34,606															
	Subtotal	236,711		118,430	655	19,791	4,312	-	-	-	-	-	26,157	67,366	-	-	-	-
Others	556,746	Operational subsidies to National University Corporations(Incorporated Administrative Agency	14,433	Space charge 44	Space charge 172	Space charge 172	Space charge 172											
	362	Funding by WPI Academy	44	Other outsourcing 3	Other outsourcing 3	Other outsourcing 3	Other outsourcing 3											
	-	Government Subsidies except Funding from WPI Academy	1,011	Banking fee 541,255	Banking fee 190	Banking fee 190	Banking fee 190											
	1	Donations	1,011	Miscellaneous expense	Miscellaneous expense	Miscellaneous expense	Miscellaneous expense											
	-	Indirect funding	541,255	Utilities expense	Utilities expense	Utilities expense	Utilities expense											
	194	Joint research projects																
	5,121	Competitive funding																
	-	Others																
	Subtotal	562,424		556,746	362	-	1	-	-	-	-	-	194	5,121	-	-	-	-
Total	2,755,414		2,161,882	28,651	62,591	14,790	-	-	-	-	-	134,005	353,495	-	-	-	-	

Operational subsidies to National University Corporations(Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際脳脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金(WPIアカデミー国際脳脳循環の加速・拡大事業を除く)
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2022

(Thousand yens)

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others			
			Total costs	Details (no. of persons)	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details		
Personnel	1,323,353	Operational subsidies to National University Corporations/Incorporated Administrative Agency	16,198	Center director	1															
	9,160	Funding by WPI Academy	14,134	Administrative direct	1															
	31,184	Government Subsidies except Funding from WPI Academy	163,193	Principal investigator	14	-			0		-		0		-		0			
	2,091	Donations	143,531	・Full-time/ Japane	10															
	14,677	Indirect funding	9,325	・Concurrent/ Japa	3															
	36,896	Joint research projects	10,337	・Full-time/ Overse	1															
	177,074	Competitive funding	-	・Concurrent/ Over	0															
	-	Others	816,446	Other researchers	77	-			0		-		0		-		0		0	
			-	・Associate professor	0															
			816,446	・Assistant professor	77															
Subtotal	1,594,435		1,323,353		216	9,160		3	31,184	12	2,091	1	14,677	2	36,896	13	177,074	-	0	
	566,385	Operational subsidies to National University Corporations/Incorporated Administrative Agency	135,660	Cost of consumables		384		1		395	Cost of temporary worker	1,242		21,004	Cost of consumables		45,180	Cost of consumables		
	7,072	Funding by WPI Academy	292,831	Cost of utilities		1,761			280		Cost of temporary worker			27,351	Cost of temporary worker		8,326	Cost of temporary worker		
	-	Government Subsidies except Funding from WPI Academy	15,393	Cost of temporary workers		277					Cost of consumables			5,517	Maintenance and repair		8,158	Maintenance and repair		
	675	Donations	3,030	Expense for symposium		2,891								495	advertisement		360	Allowance		
	1,242	Indirect funding	20,701	Information terminal		1,759								1,080	Allowance					
	55,447	Joint research projects	43,662	Maintenance and repair																
	62,024	Competitive funding	23,053	Communication and transport																
	-	Others	75	Advertisement																
			31,980	Others																
Subtotal	692,845		566,385			7,072		-		675		1,242		55,447		62,024		-		
	31,214	Operational subsidies to National University Corporations/Incorporated Administrative Agency	14,654	Domestic travel costs		286						121	Domestic travel costs		1,097	Domestic travel costs		3,671	Domestic travel costs	
	3,193	Funding by WPI Academy	15,445	Overseas travel cost		2,713							Overseas travel cost		6,715	Overseas travel cost		9,006	Overseas travel cost	
	-	Government Subsidies except Funding from WPI Academy	1,038	Accommodation		194							Accommodation			Accommodation			Accommodation	
	-	Donations	77	Other																
	121	Indirect funding																		
	7,812	Joint research projects																		
	12,677	Competitive funding																		
	-	Others																		
	Subtotal	55,017		31,214			3,193		-		-		121		7,812		12,677		-	
-		Operational subsidies to National University Corporations/Incorporated Administrative Agency				1,923														
1,923		Funding by WPI Academy																		
-		Government Subsidies except Funding from WPI Academy																		
-		Donations																		
-		Indirect funding																		
-		Joint research projects																		
-		Competitive funding																		
-		Others																		
Subtotal		1,923		-			1,923		-		-		-		-		-		-	
	119,387	Operational subsidies to National University Corporations/Incorporated Administrative Agency	6,854	Book		4,350	paper submission fee	20	registration fee	30	registration fee	134	registration fee	305	Book		1,647	Book		
	5,661	Funding by WPI Academy	42,486	Research material		1,311		17,183	Non-asset goods	62	Research material			757	registration fee		549	registration fee		
	17,203	Government Subsidies except Funding from WPI Academy	886	Academic association fee						242	Non-asset goods			10,872	Research material		24,643	Research material		
	334	Donations	4,320	registration fee										3,957	Non-asset goods		15,704	Non-asset goods		
	134	Indirect funding	2,663	Metal reforming etc																
	15,891	Joint research projects	37,873	Non-asset goods																
	42,543	Competitive funding	22,149	internal utility charge																
	-	Others	2,156	utility charge																
	Subtotal	201,153		119,387			5,661		17,203		334		134		15,891		42,543		-	
1,500		Funding by WPI Academy				1,500	Other	3,665	Other	308	Other	1,213		5,914	technical service		19,017	outsourcing		
3,665		Government Subsidies except Funding from WPI Academy												10,085	Other		20,069	technical service		
308		Donations															14,634	Others		
1,213		Indirect funding																		
15,999		Joint research projects																		
53,720		Competitive funding																		
-		Others																		
Subtotal		76,405		-			1,500		3,665		308		1,213		15,999		53,720		-	
		2,621,778		2,040,339			28,509		52,052		3,408		17,387		132,045		348,038		-	

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際語脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金 (WPIアカデミー国際語脳循環の加速・拡大事業を除く)
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2021

(Thousand yens)

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency		Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others	
			Total costs	Details (no. of persons)	金額	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details	Total costs	Details
Personnel	1,243,466	Operational subsidies to National University Corporations/Incorporated Administrative Agency	16,203	Center director	1													
	12,937	Funding by WPI Academy	15,218	Administrative direct	1													
	-	Government Subsidies except Funding from WPI Academy	165,046	Principal investigator	12	-	Principal investigator	0	-	-	0	-	0	-	0	-	0	-
	735	Donations	128,448	・Full-time/Japane	9													
	-	Indirect funding	21,810	・Concurrent/Japa	2													
	28,577	Joint research projects	14,788	・Full-time/Overse	1													
	146,554	Competitive funding	-	・Concurrent/Over	0													
	-	Others	774,486	Other researchers	70	-	Other researchers	0	-	-	0	-	0	-	0	-	0	-
			-	・Associate professor														
			774,486	/Assistant professor														
Project activities	833,737	Operational subsidies to National University Corporations/Incorporated Administrative Agency	109,475	Postdocs	28													
	754,199	Funding by WPI Academy	86,760	Research support staffs	53	6,155	Postdocs	1					12,763	Postdocs	4	1,268	Administrative staffs	1
	7,876	Government Subsidies except Funding from WPI Academy	76,278	Administrative staffs	29	6,782	Administrative staffs	3					15,814	Research support staffs	6	108,374	Postdocs	19
	1,755	Donations																
	-	Indirect funding																
	12,090	Joint research projects																
	57,817	Competitive funding																
	-	Others																
Subtotal	1,432,269		1,243,466		194	12,937		4	-	735	1	-	0	28,577	10	146,554	44	-
Travel	833,737	Operational subsidies to National University Corporations/Incorporated Administrative Agency	186,844	Cost of consumables	5,272													
	7,876	Funding by WPI Academy	50,417	Cost of utilities	1,643													
	-	Government Subsidies except Funding from WPI Academy	20,652	Information Terminal	384													
	1,755	Donations	496,286	Other costs	577													
	-	Indirect funding																
	12,090	Joint research projects																
	57,817	Competitive funding																
	-	Others																
Subtotal	833,737		754,199			7,876			1,755		-		12,090		57,817		-	
Equipment	8,931	Operational subsidies to National University Corporations/Incorporated Administrative Agency	5,175	Domestic travel costs	287													
	287	Funding by WPI Academy	741	Overseas travel cost														
	-	Government Subsidies except Funding from WPI Academy	843	Accommodation														
	87	Donations	2,172	Travel and accommodations cost for invited														
	-	Indirect funding																
	1,232	Joint research projects																
	2,072	Competitive funding																
	146	Others																
Subtotal	12,755		8,931		287		-		87		-		1,232		2,072		146	
Research projects	6,813	Operational subsidies to National University Corporations/Incorporated Administrative Agency																
		Funding by WPI Academy																
	-	Government Subsidies except Funding from WPI Academy																
	-	Donations																
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	6,813		-			6,813	-		-		-		-		-		-	
Others	223,289	Operational subsidies to National University Corporations/Incorporated Administrative Agency	223,289	Research projects														
		Funding by WPI Academy																
	-	Government Subsidies except Funding from WPI Academy																
	273	Donations																
	-	Indirect funding																
	34,561	Joint research projects																
	133,580	Competitive funding																
	-	Others																
Subtotal	391,703		223,289			-	-		273		-		34,561		133,580		-	
Total	20,287	Operational subsidies to National University Corporations/Incorporated Administrative Agency																
		Funding by WPI Academy																
	-	Government Subsidies except Funding from WPI Academy																
	-	Donations																
	-	Indirect funding																
	-	Joint research projects																
	-	Competitive funding																
	-	Others																
Subtotal	20,287		-			20,287	-		-		-		-		-		-	
Total	2,697,564		2,229,885			48,200	-		2,850		-		76,460		340,023		146	

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金（WPIアカデミー国際脳循環の加速・拡大事業を除く）
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Project Expenditures FY2020

(Thousand yens)

	Amount	Details	Operational subsidies to National University Corporations/Incorporated Administrative Agency	Funding by WPI Academy		Government Subsidies except Funding from WPI Academy		Donations		Indirect funding		Joint research projects		Competitive funding		Others	
			Total costs	Details (no. of persons)	Total costs	Total costs	Total costs	Total costs	Total costs	Total costs	Total costs	Total costs	Total costs	Total costs	Total costs	Total costs	Total costs
Personnel	1,234,181	Operational subsidies to National University Corporations/Incorporated Administrative Agency	15,884	Center director 1													
	9,279	Funding by WPI Academy	15,191	Administrative direct 1													
	0	Government Subsidies except Funding from WPI Academy	143,907	Principal investigator 12	0	Principal investigator 0	-	0	0	-	0	0	0	0	0	0	0
	0	Donations	111,009	・Full-time/Japanese 8													
	0	Indirect funding	17,104	・Concurrent/Japan 2													
	33,063	Joint research projects	14,679	・Full-time/Overseas 1													
	143,258	Competitive funding	1,116	・Concurrent/Overseas 1													
	0	Others	781,711	Other researchers 74	0	Other researchers 0	-	0	0	-	0	0	0	0	0	0	0
			781,711	・Associate professor /Assistant professor 74													
			99,483	Postdocs 31	5,663	ICYS-WPI-MANA fell 2						17,700	Postdocs 7	122,873	Postdocs 31		
Project activities	294,389	Operational subsidies to National University Corporations/Incorporated Administrative Agency	13,234	Cost of temporary workers 8,102													
	15,880	Funding by WPI Academy	470	International symposiums 557													
	0	Government Subsidies except Funding from WPI Academy	52,627	Cost of consumables 576													
	0	Donations	163,353	Cost of utilities 600													
	0	Indirect funding	64,704	Other costs 6,045													
	0	Joint research projects															
	0	Competitive funding															
	0	Others															
Subtotal	1,419,781		1,234,181	205	9,279	3	-	0	0	-	0	33,063	14	143,258	46	0	0
Travel	7,063	Operational subsidies to National University Corporations/Incorporated Administrative Agency	2,686	Domestic travel costs 27													
	186	Funding by WPI Academy	207	Overseas travel cost 159													
	0	Government Subsidies except Funding from WPI Academy	4,170	Travel and accommodations cost for invited													
	0	Donations															
	0	Indirect funding															
	0	Joint research projects															
	0	Competitive funding															
	0	Others															
Subtotal	310,268		294,389	15,880	-	0	-	0	-	0	0	0	0	0	0	0	0
Equipment	6,111	Operational subsidies to National University Corporations/Incorporated Administrative Agency	6,111	Equipment													
	0	Funding by WPI Academy															
	0	Government Subsidies except Funding from WPI Academy															
	0	Donations															
	0	Indirect funding															
	0	Joint research projects															
	0	Competitive funding															
	0	Others															
Subtotal	6,111		0	6,111	-	0	-	0	-	0	0	0	0	0	0	0	0
Research projects	274,942	Operational subsidies to National University Corporations/Incorporated Administrative Agency	274,942	Research projects				1,180	Donations 3			175,336	Joint research projec 29	243,209	Grant-in-Aid for Scientific Research 103	6,837	Joint research projec 11
	0	Funding by WPI Academy												439,833	Government Subsidies 27		
	0	Government Subsidies except Funding from WPI Academy												20,850	Foundation Grants 18		
	1,180	Donations															
	0	Indirect funding															
	175,336	Joint research projects															
	703,892	Competitive funding															
	6,837	Others															
Subtotal	1,162,187		274,942	0	-	1,180	-	1,180	-	175,336	703,892	6,837					
Others	14,095	Operational subsidies to National University Corporations/Incorporated Administrative Agency	14,095	Other expenses								-33,063	Personnel*	-143,258	Personnel*		
	0	Funding by WPI Academy															
	0	Government Subsidies except Funding from WPI Academy															
	0	Donations															
	0	Indirect funding															
	-33,063	Joint research projects															
	-143,258	Competitive funding															
	0	Others															
Subtotal	-162,226		0	14,095	-	0	-	0	-	-33,063	-143,258	0					
Total	2,743,371		1,810,574	45,552	-	1,180	-	1,180	-	175,336	703,892	6,837					

*Research projects are included in Personal expense then deducting.

Operational subsidies to National University Corporations/Incorporated Administrative Agency	運営費交付金
Funding by WPI Academy	WPIアカデミー国際脳循環の加速・拡大事業
Government Subsidies except Funding from WPI Academy	機関補助金 (WPIアカデミー国際脳循環の加速・拡大事業を除く)
Donations	寄付金
Indirect funding	間接経費
Joint research projects	共同研究費
Competitive funding	競争的資金
Others	その他

Appendix 4 Outreach Activities and Their Results

List up to three of the Center's outreach activities carried out during the period between FY 2020 and 2023 that have contributed to enhancing the brand or recognition of your Center and/or the brand of the overall WPI program, and describe its concrete contents and effect in narrative style. (Where possible, indicate the results in concrete numbers.)

Examples:

- As a result of using a new OO press-release method, a OO% increase in media coverage was obtained over the previous year.
- By holding seminars for the public that include people from industry, requests for joint research were received from companies.
- We changed our public relations media. As a resulting of using OO to disseminate information, a OO% increase in inquiries from researchers was obtained over the previous year.
- As a result of vigorously carrying out OO outreach activity, ¥OO in external funding was acquired.

Enter a list of your outreach activities in Attachment 4a.

Example 1: Publications

MANA produces the following publications in print on a regular basis to publicize its research results and activities as a WPI center.

- MANA brochure (Japanese/English): Provides the overview of MANA, research environment, and introductions of research groups and researchers
- MANA Digest (English): Features the latest research achievements and activities in an annual report.
- Convergence (Japanese/English): Offers relatively easy-to-understand research insights, focusing on detailed research projects and researcher's interviews, etc.
- E-bulletin (English): Introduction of relatively specialized research through MANA's latest papers and research columns.

Of the above, "MANA Digest" was published as a special issue in 2022 to commemorate the 15th anniversary of MANA's founding, and to document the history of nano architectonics research achievements.

"Convergence" has been suspended publication in March 2021, and "E-bulletin" has reduced its circulation and the number of issues and annual publications from FY2020 to FY2022, contribute to reduce printing costs. This is a process that accompanies our plan to shift our publications from printed booklets to digital formats, and we will shift our focus to building an attractive website that will increase access to our website.

Example 2: Research Highlights

Apart from NIMS press releases, MANA has been conducting its own PR activity titled "Research Highlights" since 2011. Specifically, it is a wire distribution of research results and papers of MANA-affiliated researchers, mainly for overseas media. Approximately 10 articles are distributed annually. At the start of the program, activities were carried out through an email newsletter, but switched to media-targeted PR via wire distribution in 2019.

The number of views has gradually increased since the start of distribution, with an average of more than 4,000 page views (English only) per press release over the four-year period from FY2020 to FY2023. As a result, the number of media coverage has also increased, with notable achievements including features in widely read media outlets as "Yahoo! Finance", "MarketWatch" and so on.

For the Corona disaster from 2020, in anticipation of increased website traffic, the "Research Highlights" were translated into French, German, and Spanish as well as English, and three wire transmissions to European countries were attempted in 2021, resulted in more than double the average number of page views compared to the usual (English only). Although the multilingualization is a temporary trial that is not being implemented currently, it was valuable in understanding the demands of European-speaking countries.

We will continue to distribute "Research Highlights" with improvements depending on the situation.

Example 3: Nano-Car Race

The NIMS-MAMA team participated in an event called the "Nano-Car Race" event held on March 24

and 25, 2022, and conducted outreach activities related to this event.

The "Nano-car Race" is an event organized by Dr. Cristian Joachim of CEMS/CNRS (Centre National de la Recherche Scientifique, France), who is also a MANA satellite PI. The teams were recruited from around the world and competed to see how far a nanoscale molecule (Nano-car) could travel on a metal surface in vacuum in 24 hours.

Outreach activities provided live streaming on the event day, as well as introduced at the NIMS Open House in May 2021, prior to the conference. The outline and scientific significance of the "nano-car race" were widely introduced to the public through events such as a team press conference and a special lecture at the Tokyo International French Institute (LFIT) in October 2022.

On the day of the race, in addition to the official streaming by the organizers, we also conducted our own live streaming in Japanese, which included not only the local scene of the race but also commentary on the race and an event featuring the director of the International Institute for Integrative Sleep Medicine (WPI-IIIS) at the University of Tsukuba.

As a result, the live Japanese streaming of the race recorded nearly five times as many views as the organizer's official streaming. Furthermore, more than 50 TV, newspaper, and other media outlets broadcasted or ran articles about the "Nano-car race". This success was the results of our vigorous outreach activities in pursuit of communicating the excitement and depth of science from multiple angles, and served as a good example of how the appeal of science could be widely communicated.

Appendix 4a State of Outreach Activities from FY 2020 to FY 2023

* For each activity, enter the number of times that the activity was held each fiscal year.

Activities	FY 2020	FY 2021	FY 2022	FY 2023
	(number of activities, times held)	(number of activities, times held)	(number of activities, times held)	(number of activities, times held)
PR brochure, pamphlet	2	3	2	2
Lectures, seminars for general public	3	4	5	3
Teaching, experiments, training for elementary, secondary and high school students	3	3	1	1
Science café	0	1	0	1
Open house	1	1	1	1
Participating, exhibiting in events	0	3	4	5
Press releases	8	19	9	10
Publications of popular science books	4	3	3	0
Others ("Research Highlights" wired distributions)	9	9	6	6

*If there are activities that the center hasn't implemented, delete those lines. If you have other activities, list them in the space between parentheses after "Others" and state the number of times they were held in the spaces on the right. Another line under "Others" can be added, if needed.

<Notes>

"Research Highlights" wired distributions : MANA's research achievement is posted the articles on the overseas web media through the distributions.

WPI Academy

Submittal of List of Center's Research Results

Prepare the following two materials and submit them with your Activities Report.

1. Refereed Papers published from 2020 to 2023 (Free format)

List only the Center's refereed papers published during the period from 2020 to 2023. (Note: The list should be for the calendar year, not the fiscal year.)

Divide the papers into two categories, A and B.

A. WPI papers

List papers whose author(s) can be identified as affiliated with the WPI program (e.g., that state "WPI" and the name of the WPI center (WPI-center name)). (Not including papers in which the names of persons affiliated with the WPI program are contained only in the acknowledgements.)

B. WPI-related papers

List papers related to the WPI Academy center but whose authors are not noted in the institutional affiliations as WPI affiliated. (Including papers whose acknowledgements contain the names of researchers affiliated with the WPI program.)

Note: On 14 December 2011, the Basic Research Promotion Division (the Basic and Generic Research Division at present) in MEXT's Research Promotion Bureau circulated an instruction requiring paper authors to include the name or abbreviation of their WPI center among their institutional affiliations.

Method of listing paper

- For each, write the author name(s); year of publication; journal name, volume, page(s) (or DOI number), and article title. Any listing order may be used as long as format is consistent. (The names of the center researchers do not need to be underlined.)
- If a paper has many authors (say, more than 10), all of their names do not need to be listed.

2. Submission of electronic data of refereed papers published in 2023

- Among the papers listed in the Item 1, provide a .csv file output of the papers published in 2023 from the Web of Science (e.g.) or other database giving the paper's raw data including Document ID. (Note: the Document ID is assigned by paper database.)
- The papers should be divided into A or B categories on separate sheets, not divided by paper categories.

3. Use in assessments

- The list of papers will be used in assessing the state of WPI Academy center's research progress.
- It will be used as reference in analyzing the trends and overall state of research in the WPI Program and/or the said WPI Academy center, not for evaluating individual researcher performance.
- The special characteristics of each research domain will be considered when conducting assessments.

Refereed Papers from MANA 2020-2023:

A. WPI papers 2020 (648, A20)

B. WPI-related papers 2020 (0)

A1. Original articles 2020 (600)

1 2020-001	M. Aalinejad, N.N. Pesyan, E. Doustkhah, <i>Diaza crown-type macromocycle (kryptofix 22) functionalised carbon nanotube for efficient N^{2+} loading; A unique catalyst for cross-coupling reactions</i> , <i>Molecular Catalysis</i> 494 , 111117 (2020). doi: 10.1016/j.mcat.2020.111117; WOS:000566543400004; 2-s2.0-85087715639
2 2020-002	M.H. Abd Aziz, M.H.D. Othman, N.H. Alias, T. Nakayama, Y. Shingaya, N.A. Hashim, T.A. Kurniawan, T. Matsuura, M.A. Rahman, J. Jaafer, <i>Enhanced omniphobicity of mullite hollow fiber membrane with organosilane-functionalized TiO_2 micro-flowers and nanorods layer deposition for desalination using direct contact membrane distillation</i> , <i>Journal of Membrane Science</i> 607 , 118137 (2020). doi: 10.1016/j.memsci.2020.118137; WOS:000539297200001; 2-s2.0-85083289781
3 2020-003	H.M. Abdelaal, Y. Ide, <i>Microporous titanate nanofibers as excellent adsorbents for water purification and softening</i> , <i>Chemistry Letters</i> 49 (11), 1274 (2020). doi: 10.1246/CL.200446; WOS:000580581300002; 2-s2.0-85094210790
4 2020-004	M.F. Abdelar, M. El-Kemary, N. Fukata, <i>Downshifting of highly energetic photons and energy transfer by Mn-doped perovskite $CsPbCl_3$ nanocrystals in hybrid organic/silicon nanostructured solar cells</i> , <i>Nano Energy</i> 77 , 105163 (2020). doi: 10.1016/j.nanoen.2020.105163; WOS:000581738300056; 2-s2.0-85088649371
5 2020-005	H. Abe, K. Nozaki, S. Sokabe, A. Kumatani, T. Matsue, H. Yabu, <i>S/N Co-Doped Hollow Carbon Particles for Oxygen Reduction Electrocatalysts Prepared by Spontaneous Polymerization at Oil- Water Interfaces</i> , <i>ACS Omega</i> 5 (29), 18391 (2020). doi: 10.1021/acsomega.0c02182; WOS:000557750100061; 2-s2.0-85088856312
6 2020-006	N. Abraham, K. Murali, K. Watanabe, T. Taniguchi, K. Majumdar, <i>Astability versus Bistability in van der Waals Tunnel Diode for Voltage Controlled Oscillator and Memory Applications</i> , <i>ACS Nano</i> 14 (11), 15678 (2020). doi: 10.1021/acsnano.0c06630; WOS:000595533800110; 2-s2.0-85096336637
7 2020-007	J. Adachi, T. Mori, R. Inoue, M. Naito, N.H.T. Le, S. Kawamorita, J.P. Hill, T. Naota, K. Ariga, <i>Emission Control by Molecular Manipulation of Double-Paddled Binuclear Pt-II Complexes at the Air-Water Interface</i> , <i>Chemistry - An Asian Journal</i> 15 (3), 406 (2020). doi: 10.1002/asia.201901691; WOS:000506467600001; 2-s2.0-85077994328
8 2020-008	S. Adachi, R. Matsumoto, S. Yamamoto, T.D. Yamamoto, K. Terashima, Y. Saito, M.E. Echevarria, P.B. deCastro, P. Song, S. Iwasaki, H. Takeya, Y. Takano, <i>Demonstration of electric double layer gating under high pressure by the development of field-effect diamond anvil cell</i> , <i>Applied Physics Letters</i> 116 (22), 223506 (2020). doi: 10.1063/5.0004973; WOS:000538128200002
9 2020-009	A. Ahmed, M.S.A. Hossain, S.M.K.N. Islam, F. Yun, G.S. Yang, R. Hossain, A. Khan, J. Na, M. Eguchi, Y. Yamauchi, X.L. Wang, <i>Significant Improvement in Electrical Conductivity and Figure of Merit of Nanoarchitected Porous $SrTiO_3$ by La Doping Optimization</i> , <i>ACS Applied Materials & Interfaces</i> 12 (25), 28057 (2020). doi: 10.1021/acsaami.0c01869; WOS:000543780900020; 2-s2.0-85087111219
10 2020-010	A. Aiba, S. Kaneko, T. Tsuruoka, K. Terabe, M. Kiguchi, T. Nishino, <i>Effects of water adsorption on conductive filaments of a Ta_2O_5 atomic switch investigated by nondestructive electrical measurements</i> , <i>Applied Physics Letters</i> 117 (23), 233104 (2020).

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11 2020-011	W.A. Amer, J. Wang, B. Ding, T. Li, A.E. Allah, M.B. Zakaria, J. Henzie, Y. Yamauchi, <i>Physical Expansion of Layered Graphene Oxide Nanosheets by Chemical Vapor Deposition of Metal-Organic Frameworks and their Thermal Conversion into Nitrogen-Doped Porous Carbons for Supercapacitor Applications</i> , <i>ChemSusChem</i> 13 (6), 1629 (2020). doi: 10.1002/cssc.201901436; WOS:000483969800001; 2-s2.0-85071313544
12 2020-012	H. Anzai, T. Watanabe, X.B. Han, N.K. Putra, Z. Wang, H. Kobayashi, M. Ohta, <i>Endothelial cell distributions and migration under conditions of flow shear stress around a stent wire</i> , <i>Technology and Health Care</i> 28 (4), 345 (2020). doi: 10.3233/THC-191911; WOS:000551107900001; 2-s2.0-85088849659
13 2020-014	K. Ariga, <i>The evolution of molecular machines through interfacial nanoarchitectonics: from toys to tools</i> , <i>Chemical Science</i> 11 (39), 10594 (2020). doi: 10.1039/d0sc03164j; WOS:000577727000003; 2-s2.0-85092168335
14 2020-016	K. Ariga, <i>Don't Forget Langmuir-Blodgett Films 2020: Interfacial Nanoarchitectonics with Molecules, Materials, and Living Objects</i> , <i>Langmuir</i> 36 (26), 7158 (2020). doi: 10.1021/acs.langmuir.0c01044; WOS:000548555400002; 2-s2.0-85088051821
15 2020-017	K. Ariga, <i>Molecular recognition at the air-water interface: nanoarchitectonic design and physicochemical understanding</i> , <i>Physical Chemistry Chemical Physics</i> 22 (43), 24856 (2020). doi: 10.1039/d0cp04174b; WOS:000588601200002; 2-s2.0-85096151986
16 2020-018	K. Ariga, <i>Atomic and Organic Nanoarchitectonics</i> , <i>Trends in Chemistry</i> 2 (9), 779 (2020). doi: 10.1016/j.trechm.2020.07.003; WOS:000566666900001; 2-s2.0-85088781357
17 2020-024	M.H.N. Assadi, M. Okubo, A. Yamada, Y. Tateyama, <i>Possible high-potential ilmenite type Na_1MO_3 ($M = V-Ni$) cathodes realized by dominant oxygen redox reaction</i> , <i>Physical Review Materials</i> 4 (1), 015401 (2020). doi: 10.1103/PhysRevMaterials.4.015401; WOS:000505499400003; 2-s2.0-85078364251
18 2020-025	P.A. Atanasov, N.N. Nedyalkov, N. Fukata, W. Jevasuwan, <i>Ag and Au nanostructures for surface-enhanced Raman spectroscopy of Mospilan 20 SP (acetamiprid)</i> , <i>Journal of Raman Spectroscopy</i> 51 (12), 2398 (2020). doi: 10.1002/jrs.5993; WOS:000573381300001; 2-s2.0-85091614015
19 2020-026	P.A. Atanasov, N.N. Nedyalkov, N. Fukata, W. Jevasuwan, T. Subramani, <i>Surface-Enhanced Raman Spectroscopy (SERS) of Neonicotinoid Insecticide Thiachloprid Assisted by Silver and Gold Nanostructures</i> , <i>Applied Spectroscopy</i> 74 (3), 357 (2020). doi: 10.1177/0003702819878267; WOS:000499538500001; 2-s2.0-85075562255
20 2020-027	P.A. Atanasov, N.N. Nedyalkov, N. Fukata, W. Jevasuwan, T. Subramani, <i>Surface-enhanced Raman spectroscopy of neonicotinoid insecticide imidacloprid, assisted by gold and silver nanostructures</i> , <i>Spectroscopy Letters</i> 53 (3), 184 (2020). doi: 10.1080/00387010.2020.1726400; WOS:000514559100001; 2-s2.0-85079704200
21 2020-028	T. Baba, T. Baba, T. Mori, <i>Experimental investigation of reciprocity of temperature response across two layer samples by flash method</i> , <i>Review of Scientific Instruments</i> 91 (1), 014905 (2020). doi: 10.1063/1.5124799; WOS:000518012200001; 2-s2.0-85078663229
22 2020-029	T. Baba, K. Sodeyama, Y. Kawamura, Y. Tateyama, <i>Li-ion transport at the interface between a graphite anode and Li_2CO_3 solid electrolyte interphase: ab initio molecular dynamics study</i> , <i>Physical Chemistry Chemical Physics</i> 22 (19), 10764 (2020).

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23 2020-030	P. Baire, G.S. Kumar, S. Acharya, S. Maji, K. Ariga, L.K. Shrestha, <i>Vortex-Aligned Ordered Film of Crystalline Fullerene C-70 Microtubes with Enhanced Photoluminescence and Photovoltaics Properties</i> , <i>Journal of Nanoscience and Nanotechnology</i> 20 (5), 2971 (2020). doi: 10.1166/jnn.2020.17461; WOS:000492366900037
24 2020-031	J.S. Baker, D.R. Bowler, <i>Polar Morphologies from First Principles: PbTiO₃ Films on SrTiO₃ Substrates and the $p(2\times 1)$ Surface Reconstruction</i> , <i>Advanced Theory and Simulations</i> 3 (11), 2000154 (2020). doi: 10.1002/adts.202000154; WOS:000570455600001; 2-s2.0-85090756803
25 2020-032	J.S. Baker, T. Miyazaki, D.R. Bowler, <i>The pseudoatomic orbital basis: electronic accuracy and soft-mode distortions in ABO₃ perovskites</i> , <i>Electronic Structure</i> 2 (2), 025002 (2020). doi: 10.1088/2516-1075/ab950e; 2-s2.0-85095352047
26 2020-033	L. Banszerus, T. Fabian, S. Möller, E. Icking, H. Heiming, S. Trellenkamp, F. Lentz, D. Neumaier, M. Otto, K. Watanabe, T. Taniguchi, F. Libisch, C. Volk, C. Stampfer, <i>Electrostatic Detection of Shubnikov-de Haas Oscillations in Bilayer Graphene by Coulomb Resonances in Gate-Defined Quantum Dots</i> , <i>Physica Status Solidi (B)</i> 257 (12), 2000333 (2020). doi: 10.1002/pssb.202000333; WOS:000573846000001; 2-s2.0-85091724587
27 2020-034	L. Banszerus, A. Rothstein, T. Fabian, S. Moller, E. Icking, S. Trellenkamp, F. Lentz, D. Neumaier, K. Watanabe, T. Taniguchi, F. Libisch, C. Volk, C. Stampfer, <i>Electron-Hole Crossover in Gate-Controlled Bilayer Graphene Quantum Dots</i> , <i>Nano Letters</i> 20 (10), 7709 (2020). doi: 10.1021/acs.nanolett.0c03227; WOS:000613073900025; 2-s2.0-85092945545
28 2020-035	B.K. Barman, T. Nagao, K.K. Nanda, <i>Dual roles of a transparent polymer film containing dispersed N-doped carbon dots: A high-efficiency blue light converter and UV screen</i> , <i>Applied Surface Science</i> 510 , 145405 (2020). doi: 10.1016/j.apsusc.2020.145405; WOS:000514902000035; 2-s2.0-85078188017
29 2020-036	K. Barthelmi, J. Klein, A. Hötger, L. Sigl, F. Sigger, E. Mitterreuter, S. Rey, S. Gyger, M. Lorke, M. Florian, F. Jahnke, T. Taniguchi, K. Watanabe, V. Zwiller, K.D. Jöns, U. Wurstbauer, C. Kastl, A. Weber-Bargioni, J.J. Finley, K. Müller, A.W. Holleitner, <i>Atomistic defects as single-photon emitters in atomically thin MoS₂</i> , <i>Applied Physics Letters</i> 117 (7), 070501 (2020). doi: 10.1063/5.0018557; WOS:000563577500001; 2-s2.0-85090137576
30 2020-037	S. Bashir, S.K. Moosvi, T. Jan, G. Rydzek, S.H. Mir, M.A. Rizvi, <i>Development of Polythiophene/Prussian Red Nanocomposite with Dielectric, Photocatalytic and Metal Scavenging Properties</i> , <i>Journal of Electronic Materials</i> 49 (6), 4018 (2020). doi: 10.1007/s11664-020-08117-7; WOS:000524922300002; 2-s2.0-85083463348
31 2020-038	R. Bekarevich, Y. Pihosh, Y. Tanaka, K. Nishikawa, Y. Matsushita, T. Hiroto, H. Ohata, T. Ohno, T. Minegishi, M. Sugiyama, T. Kitamori, K. Mitsuishi, K. Takeda, <i>Conversion Reaction in the Binder-Free Anode for Fast-Charging Li-Ion Batteries Based on WO₃ Nanorods</i> , <i>ACS Applied Energy Materials</i> 3 (7), 6700 (2020). doi: 10.1021/acsaem.0c00844; WOS:000557375200075; 2-s2.0-85095616506
32 2020-039	P.Y.L. Bhanja, Y. Kim, K. Kani, B. Paul, T. Debnath, J.J. Lin, A. Bhaumik, Y. Yamauchi, <i>Novel porous metal phosphonates as efficient electrocatalysts for the oxygen evolution reaction</i> , <i>Chemical Engineering Journal</i> 396 , 125245 (2020).

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33 2020-040	P. Bhanja, Y. Kim, B. Paul, J.J. Lin, S.M. Alshehri, T. Ahamad, Y.V. Kaneti, A. Bhaumik, Y. Yamauchi, <i>Facile Synthesis of Nanoporous Transition Metal-Based Phosphates for Oxygen Evolution Reaction</i> , <u>ChemCatChem</u> 12 (7), 2091 (2020). doi: 10.1002/cctc.201901803; WOS:000512470000001; 2-s2.0-85079440773
34 2020-041	P. Bhanja, A. Paul, S. Chatterjee, Y.V. Kaneti, J. Na, Y. Sugahara, A. Bhaumik, Y. Yamauchi, <i>Crystalline Porous Organic Polymer Bearing -SO₃H Functionality for High Proton Conductivity</i> , <u>ACS Sustainable Chemistry & Engineering</u> 8 (6), 2423 (2020). doi: 10.1021/acssuschemeng.9b06234; WOS:000514488600010; 2-s2.0-85079524962
35 2020-042	C. Bourges, N. Sato, T. Baba, T. Baba, I. Ohkubo, N. Tsujii, T. Mori, <i>Drastic power factor improvement by Te doping of rare earth-free CoSb₃-skutterudite thin films</i> , <u>RSC Advances</u> 10 (36), 21129 (2020). doi: 10.1039/d0ra02699a; WOS:000542722900011; 2-s2.0-85086517214
36 2020-043	C. Bourges, B. Srinivasan, B. Fontaine, P. Sauerschnig, A. Minard, J.F. Halet, Y. Miyazaki, D. Berthebaud, T. Mori, <i>Tailoring the thermoelectric and structural properties of Cu-Sn based thiospinel compounds CuM_{1+x}Sn_{1-x}S₄ (M = Ti, V, Cr, Co)</i> , <u>Journal of Materials Chemistry C</u> 8 (46), 16368 (2020). doi: 10.1039/d0tc04393a; WOS:000597117200010; 2-s2.0-85097716435
37 2020-044	Z.X. Cai, J. Na, J.J. Lin, A.A. Alshehri, K.A. Alzahrani, Y.G. Alghamdi, H. Lim, J. Zheng, W. Xia, Z.L. Wang, Y. Yamauchi, <i>Hierarchical Tubular Architecture Constructed by Vertically Aligned CoS₂-MoS₂ Nanosheets for Hydrogen Evolution Electrocatalysis</i> , <u>Chemistry - A European Journal</u> 26 (28), 6195 (2020). doi: 10.1002/chem.201905123; WOS:000528883700001; 2-s2.0-85084150311
38 2020-045	L. Cao, P.C. Dai, J. Tang, D. Li, R.H. Chen, D.D. Liu, X. Gu, L.J. Li, Y. Bando, Y.S. Ok, X.B. Zhao, Y. Yamauchi, <i>Spherical Superstructure of Boron Nitride Nanosheets Derived from Boron-Containing Metal-Organic Frameworks</i> , <u>Journal of the American Chemical Society</u> 142 (19), 8755 (2020). doi: 10.1021/jacs.0c01023; WOS:000535252100029; 2-s2.0-85087316425
39 2020-046	M.K. Chahal, H.B. Gobeze, W.A. Webre, P.A. Karr, D.T. Payne, K. Ariga, F. D'Souza, J.P. Hill, <i>Electron and energy transfer in a porphyrin-oxoporphyrinogen-fullerene triad, ZnP-OxP-C₆₀</i> , <u>Physical Chemistry Chemical Physics</u> 22 (25), 14356 (2020). doi: 10.1039/d0cp02696d; WOS:000547975900049; 2-s2.0-85087531449
40 2020-047	M.K. Chahal, A. Liyanage, H.B. Gobeze, D.T. Payne, K. Ariga, J.P. Hill, F. D'Souza, <i>Supramolecular ultrafast energy and electron transfer in a directly linked BODIPY-oxoporphyrinogen dyad upon fluoride ion binding</i> , <u>Chemical Communications</u> 56 (27), 3855 (2020). doi: 10.1039/d0cc00633e; WOS:000526699300004; 2-s2.0-85082857591
41 2020-048	M.K. Chahal, D.T. Payne, J. Labuta, P.A. Karr, F. D'Souza, K. Ariga, J.P. Hill, <i>Selective Phase Transfer Reagents (OxP-crowns) for Chromogenic Detection of Nitrates Especially Ammonium Nitrate</i> , <u>Chemistry - A European Journal</u> 26 (58), 13177 (2020). doi: 10.1002/chem.202003166; WOS:000566716600001; 2-s2.0-85090309016
42 2020-049	M.K. Chahal, D.T. Payne, Y. Matsushita, J. Labuta, K. Ariga, J.P. Hill, <i>Molecular Engineering of beta-Substituted Oxoporphyrinogens for Hydrogen-Bond Donor Catalysis</i> , <u>European Journal of Organic Chemistry</u> 2020 (1), 82 (2020). doi: 10.1002/ejoc.201901706; WOS:000503328900001; 2-s2.0-85077069586
43	C. Chakraborty, U. Rana, S. Moriyama, M. Higuchi, <i>Multifunctional Pt(II)-Based Metallo-</i>

2020-050	<i>Supramolecular Polymer with Carboxylic Acid Groups: Electrochemical, Mechanochemical, Humidity, and pH Response</i> , <i>ACS Applied Polymer Materials</i> 2 (9), 4149 (2020). doi: 10.1021/acsapm.0c00782; WOS:000571515200046; 2-s2.0-85097601759
44 2020-051	C. Chakraborty, U. Rana, Y.S.L.V. Narayana, S. Moriyama, M. Higuchi, <i>Helical Fe(II)-Based Metallo-Supramolecular Polymers: Effect of Crown Ether Groups Located outside the Helix on Hydrous Proton Channel Formation</i> , <i>ACS Applied Polymer Materials</i> 2 (11), 4521 (2020). doi: 10.1021/acsapm.0c00611; WOS:000592755800020; 2-s2.0-85097549137
45 2020-052	Z. Chang, Y. Qiao, J. Wang, H. Deng, P. He, H.S. Zhou, <i>Fabricating better metal-organic frameworks separators for Li-S batteries: Pore sizes effects inspired channel modification strategy</i> , <i>Energy Storage Materials</i> 25 , 164 (2020). doi: 10.1016/j.ensm.2019.10.018; WOS:000508681700018; 2-s2.0-85074498346
46 2020-053	S. Che, P. Stepanov, S.P. Ge, M.L. Zhu, D.Y. Wang, Y.J. Lee, K. Myhro, Y.M. Shi, R.Y. Chen, Z.Q. Pi, C. Pan, B. Cheng, T. Taniguchi, K. Watanabe, Y. Barlas, R.K. Lake, M. Bockrath, J. Hwang, C.N. Lau, <i>Substrate-Dependent Band Structures in Trilayer Graphene/h-BN Heterostructures</i> , <i>Physical Review Letters</i> 125 (24), 246401 (2020). doi: 10.1103/PhysRevLett.125.246401; WOS:000597151900014; 2-s2.0-85098195317
47 2020-055	G.R. Chen, Y.X. Yan, J. Wang, Y.S. Ok, G.Y. Zhong, B.Y. Guan, Y. Yamauchi, <i>General Formation of Macro-/Mesoporous Nanoshells from Interfacial Assembly of Irregular Mesoporous Nanounits</i> , <i>Angewandte Chemie - International Edition</i> 59 (44), 19663 (2020). doi: 10.1002/anie.202007031; WOS:000560822900001; 2-s2.0-85089509545
48 2020-056	J. Chen, X. Wang, Z.W. Hu, L.H. Tjeng, S. Agrestini, M. Valvidares, K. Chen, L. Nataf, F. Baudelet, M. Nagao, Y. Inaguma, A.A. Belik, Y. Tsujimoto, Y. Matsushita, T. Kolodiazny, R. Sereika, M. Tanaka, K. Yamaura, <i>Enhanced magnetization of the highest-T-C ferrimagnetic oxide Sr₂CrOsO₆</i> , <i>Physical Review B</i> 102 (18), 184418 (2020). doi: 10.1103/PhysRevB.102.184418; WOS:000589599000005; 2-s2.0-85097204535
49 2020-057	J. Chen, W. Yi, A. Kumar, A. Iwanade, R. Tanaka, S. Takashima, M. Edo, S. Ito, T. Kimura, T. Ohkubo, T. Sekiguchi, <i>Electron-Beam-Induced Current Study of Dislocations and Leakage Sites in GaN Schottky Barrier Diodes</i> , <i>Journal of Electronic Materials</i> 49 (9), 5196 (2020). doi: 10.1007/s11664-020-08081-2; WOS:000521899400002; 2-s2.0-85082969847
50 2020-058	K. Chen, T.D. Dao, T.D. Ngo, H.D. Ngo, A. Tamani, S. Ishii, X. Li, H. Misawa, T. Nagao, <i>Enhanced photocurrent generation from indium-tin-oxide/Fe₂TiO₅ hybrid nanocone arrays</i> , <i>Nano Energy</i> 76 , 104965 (2020). doi: 10.1016/j.nanoen.2020.104965; WOS:000710961100001; 2-s2.0-85087110219
51 2020-059	L. Chen, G. Chen, W. Tang, H. Wang, F. Chen, X. Liu, R.Z. Ma, <i>A robust and lithiophilic three-dimension framework of CoO nanorod arrays on carbon cloth for cycling-stable lithium metal anodes</i> , <i>Materials Today Energy</i> 18 , 100520 (2020). doi: 10.1016/j.mtener.2020.100520; WOS:000601397100008; 2-s2.0-85091964160
52 2020-060	Y.S. Chen, B.K. Chao, T. Nagao, C.H. Hsueh, <i>Effects of Ag particle geometry on photocatalytic performance of Ag/TiO₂ reduced graphene oxide ternary systems</i> , <i>Materials Chemistry and Physics</i> 240 , 122216 (2020). doi: 10.1016/j.matchemphys.2019.122216; WOS:000505100900089; 2-s2.0-85072553024
53	P. Cheng, M. Kim, H. Lim, J. Lin, N.L. Torad, X. Zhang, M.S.A. Hossain, C.W. Wu, C.

2020-061	Wang, J. Na, Y. Yamauchi, <i>A General Approach to Shaped MOF-Containing Aerogels toward Practical Water Treatment Application</i> , <u>Advanced Sustainable Systems</u> 4 (8), 2000060 (2020). doi: 10.1002/adsu.202000060; WOS:000531913100001; 2-s2.0-85084415393
54 2020-062	P. Cheng, C.H. Wang, Y.V. Kaneti, M. Eguchi, J.J. Lin, Y. Yamauchi, J. Na, <i>Practical MOF Nanoarchitectonics: New Strategies for Enhancing the Processability of MOFs for Practical Applications</i> , <u>Langmuir</u> 36 (16), 4231 (2020). doi: 10.1021/acs.langmuir.0c00236; WOS:000529875000001; 2-s2.0-85083830494
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A12	(Book Chapter) S.B. Jin, J. He, Q.M. Ji, J.P. Hill, K. Ariga, <i>Supramolecular Catalysts</i> , <u>Soft</u>

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B. WPI-related papers 2020 (0)

A. WPI papers 2021 (739, A21)**B. WPI-related papers 2021 (96)****A1. Original articles 2021 (692, A1)**

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802 2023-802	A. Assouline, L. Pugliese, H. Chakraborti, S. Lee, L. Bernabeu, M. Jo, K. Watanabe, T. Taniguchi, D.C. Glatli, N. Kumada, H.S. Sim, F.D. Parmentier, P. Roulleau, <i>Emission and coherent control of Levitons in graphene</i> , <i>Science</i> 382 (6676), 1260 (2023). doi: 10.1126/science.adf9887; WOS:001174011500001; 2-s2.0-85179767232
803 2023-803	A.Z. Barabas, I. Sequeira, Y.H. Yang, A.H. Barajas-Aguilar, T. Taniguchi, K. Watanabe, J.D. Sanchez-Yamagishi, <i>Mechanically reconfigurable van der Waals devices via low-friction gold sliding</i> , <i>Science Advances</i> 9 (14), eadf9558 (2023). doi: 10.1126/sciadv.adf9558; WOS:000994524200018; 2-s2.0-85151960457
804 2023-804	J. Bradford, T.S. Cheng, T.S.S. James, A.N. Khlobystov, C.J. Mellor, K. Watanabe, T. Taniguchi, S.V. Novikov, P.H. Beton, <i>Graphene nanoribbons with hBN passivated edges grown by high-temperature molecular beam epitaxy</i> , <i>2D Materials</i> 10 (3), 035035 (2023). doi: 10.1088/2053-1583/acdefc; WOS:001016270700001; 2-s2.0-85164214980
805 2023-805	S.M. Cao, M.T. Chen, J. Zeng, N. Ma, R.J. Zheng, Y. Feng, S. Yan, J. Liu, K. Watanabe, T. Taniguchi, X.C. Xie, J.H. Chen, <i>Transport evidence of superlattice Dirac cones in graphene monolayer on twisted boron nitride substrate</i> , <i>2D Materials</i> 10 (2), 025016 (2023). doi: 10.1088/2053-1583/acbdaa; WOS:000945729800001; 2-s2.0-85149822862
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810 2023-810	S. Ghosh, M.B. Khan, P. Chava, K. Watanabe, T. Taniguchi, S. Prucnal, R. Hübner, T. Mikolajick, A. Erbe, Y.M. Georgiev, <i>Novel Mixed-Dimensional hBN-Passivated Silicon Nanowire Reconfigurable Field Effect Transistors: Fabrication and Characterization</i> , <i>ACS Applied Materials & Interfaces</i> 15 (34), 40709 (2023). doi: 10.1021/acsami.3c04808; WOS:001052716100001; 2-s2.0-85169295786
811 2023-811	A. Inbar, J. Birkbeck, J. Xiao, T. Taniguchi, K. Watanabe, B. Yan, Y. Oreg, A. Stern, E. Berg, S. Ilani, <i>The quantum twisting microscope</i> , <i>Nature</i> 614 (7949), 682 (2023). doi: 10.1038/s41586-022-05685-y; WOS:000938282600001; 2-s2.0-85148773371
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813 2023-813	T. Johnsen, C. Schattauer, S. Samaddar, A. Weston, M.J. Hamer, K. Watanabe, T. Taniguchi, R. Gorbachev, F. Libisch, M. Morgenstern, <i>Mapping quantum Hall edge states in graphene by scanning tunneling microscopy</i> , <i>Physical Review B</i> 107 (11), 115426 (2023). doi: 10.1103/physrevb.107.115426; WOS:000961165700005; 2-s2.0-85151309700
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815 2023-815	M. Kapfer, B.S. Jessen, M.E. Eisele, M. Fu, D.R. Danielsen, T.P. Darlington, S.L. Moore, N.R. Finney, A. Marchese, V. Hsieh, P. Majchrzak, Z.H. Jiang, D. Biswas, P. Dudin, J. Avila, K. Watanabe, T. Taniguchi, S. Ulstrup, P. Bøggild, P.J. Schuck, D.N. Basov, J. Hone, C.R. Dean, <i>Programming twist angle and strain profiles in 2D materials</i> , <i>Science</i> 381 (6658) 677 (2023). doi: 10.1126/science.ade9995; WOS:001054584400031; 2-s2.0-85167665907
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821 2023-821	K. Kubota, Y. Hatano, Y. Kainuma, J. Shin, D. Nishitani, C. Shinei, T. Taniguchi, T. Teraji, S. Onoda, T. Ohshima, T. Iwasaki, M. Hatano, <i>Wide temperature operation of diamond quantum sensor for electric vehicle battery monitoring</i> , <u>Diamond and Related Materials</u> 135 , 109853 (2023). doi: 10.1016/j.diamond.2023.109853; WOS:000966925300001; 2-s2.0-85151293765
822 2023-822	J. Lee, J. Kwon, E. Lee, J. Park, S. Cha, K. Watanabe, T. Taniguchi, M.H. Jo, H. Choi, <i>Spinful hinge states in the higher-order topological insulators WTe₂</i> , <u>Nature Communications</u> 14 (1), 1801 (2023). doi: 10.1038/s41467-023-37482-0; WOS:000980769900021; 2-s2.0-85151387859
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828 2023-828	C. Shen, P.J. Ledwith, K. Watanabe, T. Taniguchi, E. Khalaf, A. Vishwanath, D.K. Efetov, <i>Dirac spectroscopy of strongly correlated phases in twisted trilayer graphene</i> , <u>Nature Materials</u> 22 (3), 316 (2023). doi: 10.1038/s41563-022-01428-6; WOS:000903220300004; 2-s2.0-85144483286
829 2023-829	W. Shi, S. Kahn, N. Leconte, T. Taniguchi, K. Watanabe, M. Crommie, J. Jung, A. Zettl, <i>High-Order Fractal Quantum Oscillations in Graphene/BN Superlattices in the Extreme Doping Limit</i> , <u>Physical Review Letters</u> 130 (18), 186204 (2023). doi: 10.1103/physrevlett.130.186204; WOS:000988178500009; 2-s2.0-85158842498
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Note:

The following papers (36) from 2023 are currently not included in the Web of Science data base and therefore missing in the electronic data file.

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