World Premier International Research Center Initiative (WPI)
FY2014 WPI Project Progress Report (Post-Interim Evaluation)

Host Institution	National Institute for Materials Science (NIMS)	Host Institution Head	Sukekatsu Ushioda
Research Center	International Center for Materials Nanoarchitectonics (MANA)	Center Director	Masakazu Aono

Common instructions:
* Unless otherwise specified, prepare this report from the timeline of 31 March 2015.
* So as to base this fiscal year's follow-up review on the document "Post-interim evaluation revised center project," please prepare this report from the perspective of the revised project.
* Use yen (¥) when writing monetary amounts in the report. If an exchange rate is used to calculate the yen amount, give the rate.

Summary of State of WPI Center Project Progress

A) Organization of MANA

Research at MANA has been conducted in *four research fields*, i.e., Nano-Materials, Nano-Systems, Nano-Power and Nano-Life fields (Fig. 1). In addition, MANA puts interdisciplinary *three grand challenges*, i.e., "nanoarchitectonic artificial brain", "room- temperature superconductivity" and "practical artificial photosynthesis" (Fig. 1). All researches at MANA have been performed on the basis of MANA's unique concept of "nanoarchitectonics".

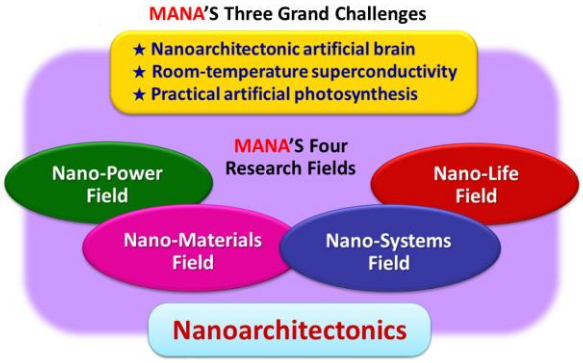

Fig. 1. MANA's four research fields and three grand challenges.

In research at MANA, we regard the fusion of various research fields as of great importance, so that we have operated MANA's internal "Fusion Research Fund", "Grand Challenge Fund", "Theory-Experiment Fusion Research Fund" and "Nano-Life Fusion Research Fund". In this way, in the past 8 years after its inauguration, MANA performed various remarkable researches of the highest world level in collaboration between *four research fields* and as to the interdisciplinary *three grand challenges*. Last year (2014), we have published a book entitled "Research at MANA" in order to report those results, which can be read at:
http://www.nims.go.jp/mana/jp/pror/periodical/p6fplp0000001t9f-att/Research_at_MANA.pdf.

Table 1 shows the workforce of MANA. MANA has 102 permanent researchers (22 Principal Investigators, 2 Associate Principal Investigators and 78 MANA Scientists), 73 postdoc researchers, 33 graduate students and 31 technical and administrative staff. The proportion of foreign researchers is 51%, showing MANA is now really international. The proportion of female researchers is 19%; we would like to increase this number to about 30%.

Table 1. Workforce of MANA

As of March 2015

Classification	Number	Non-Japanese	Female
Principal Investigator	22	8	2
Associate Principal Investigator	2	1	0
MANA Scientist (Faculty)	78	10	13
Postdoc Researcher	73	58	15
Graduate Student	33	30	10
Technical & Administrative Staff	31	1	20
Total	239	106	60

Total number of researchers: **208**
Proportion of foreign PIs: **36 %**
Proportion of foreign researchers: **51 %**
Proportion of female researchers: **19 %**

It should be mentioned that MANA has operated a program called "MANA Independent Scientists". The MANA Independent Scientists are specially selected young scientists (below 40 years old) who are benefitted regarding research budget and space. This program has been operated successfully.

B) Research activity of MANA

MANA's excellent research achievements are apparent from several indicators showing research activities of individual institutions in the world. Figure 2 shows such indicators for MANA, which were analyzed by Thomson Reuters and Elsevier. As we can see, MANA published 2,850 papers in the past 8 years and the

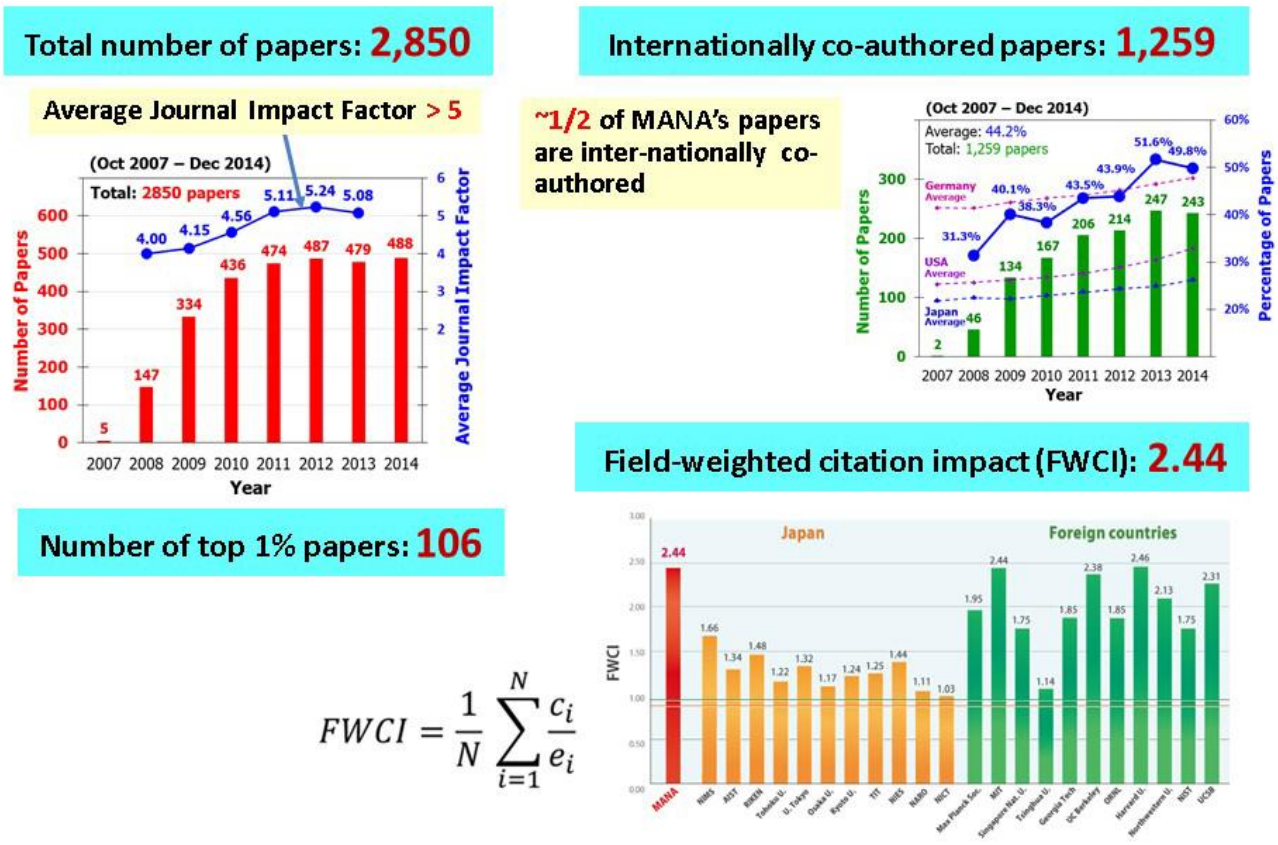

Fig. 2. Various indicators showing that the paper publication activity of MANA is at the world's highest level.

averaged impact factor (IF) of the journals in which the 2,850 papers were published is larger than 5.0 in recent years (upper left). Of the 2,850 papers, 106 are the "World Top 1% Papers" as to the number of citations (lower left); this means that MANA publishes ~13 "World Top 1% Papers" every year. Also, more than half of the papers published from MANA are internationally co-authored in a recent couple of years (upper right). Recently, Elsevier devised a new indicator called field-weighted citation impact (FWCI) to fairly compare the quality of papers published from interdisciplinary research institutions. The values of FWCI for MANA and various other institutes and universities in the world are also shown (lower right). It is found that FWCI for MANA, 2.44, is at the world top level.

・Please concisely describe the progress being made by the WPI center project from the viewpoints described below.
・In addressing the below-listed 1-6 criteria, please place emphasis on the following:
(1) Whether research is being carried out at a top world-level (including whether research advances are being made by fusing fields).
(2) Whether a proactive effort continues to be made to establish itself as a "truly" world premier international research center.
(3) Whether a steadfast effort is being made to secure the center's future development over the mid- to long term.
・Please prepare this report within 10 pages (excluding the appendices, and including Summary of State of WPI Center Project Progress (within two pages)).

1. Conducting research of the highest world level

* Regarding the criteria used when evaluating the world level of center, please note any updated results using your previous evaluation criteria and methods or any improvements you have made to those criteria and methods.

A) Introduction

Research at MANA has been conducted in four different research fields shown in Fig. 1. Also, we have performed researches about three grand challenges listed at the top of Fig. 1. All the researches at MANA have been performed on the basis of MANA's unique concept of "nanoarchitectonics"; this concept has already penetrated into researchers working at MANA.

In 2014, MANA performed various researches at the highest world level. In the following, a few examples of them are selected and described a bit in detail.

B) Selected researches in 2014

a) Visualizing superconductive coupling over atomic steps in surface superconductivity

--- *Scanning tunneling microscopy imaging under differing magnetic fields gives fundamental insights into the behavior of supercurrents and vortices on the indium-mediated silicon surface.* ---

Superconductors have effectively zero resistance and act as perpetual carriers of electric current with no need for a connected power source. As such they have many applications in electronics. One of the thinnest two-dimensional materials ever created, called Si(111)-($\sqrt{7}$ x $\sqrt{3}$)-In, recently surprised scientists with its superconducting abilities. The race is now on to find out how and why this silicon surface is capable of superconductivity, as well as what uses it may have.

Takashi Uchihashi and co-workers at MANA, together with scientists across Japan, have now uncovered the underlying structures and the behavior of currents on the surface of Si(111)-($\sqrt{7}$ x $\sqrt{3}$)-In which provide clues to its superconductivity.

The silicon surface comprises individual terraces separated by steps measuring the height of a single atom ('atomic steps'). These steps could potentially interrupt, or decouple, neighboring terraces and break the current flowing over large surfaces. Uchihashi and his team used a scanning tunnelling microscope in order to verify how superconductivity occurs in the presence of atomic steps and terraces. The team applied different magnetic fields, which influenced the strength of the current and the presence of associated vortices. By taking a series of images of the silicon surface, the team uncovered a pattern of supercurrent vortices present on the silicon surface. Two vortex types were present. Pearl vortices were present on the terrace surfaces, and appeared as bright round features in the images. However, at the atomic steps the vortices appeared to become trapped and altered in character. These elongated 'Josephson vortices' give evidence that the atomic steps work as so-called Josephson junctions, allowing coupling to occur across stepped terraces and enabling supercurrents to flow. The idea was firmly established with the help of

microscopic theoretical calculations by Xiao Hu's group at MANA.

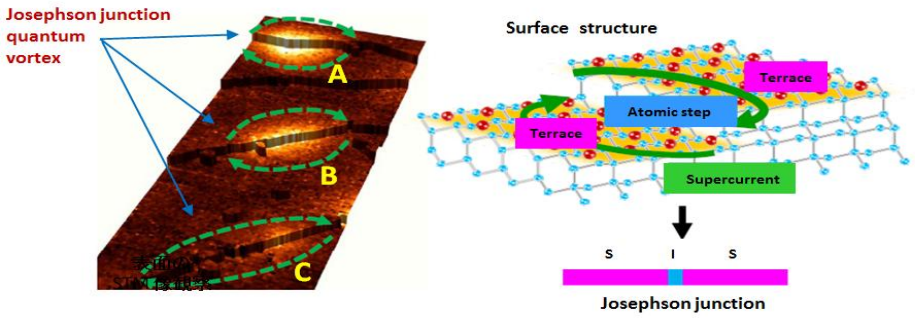

Fig. 3 (Right) Structure of the Si(111)-(√7 x √3)-In surface having atomic steps each of which acts as a Josephson junction. (Left) Josephson junction quantum vortexes observed by the scanning tunneling microscope (STM).

In this way, MANA has uncovered how supercurrents flow over atomic steps and terraces on indium-covered silicon surface (Fig. 3). Vortices trapped at the atomic steps change their characters from Pearl to Josephson vortices (from A to C in the left panel of Fig. 3). These reflect change in strength of Josephson coupling between the neighboring terraces.

Reference: "Imaging Josephson vortices on the surface superconductor using a scanning tunnelling microscope", S. Yoshizawa, H. Kim, T. Kawakami, Y. Nagai, T. Nakayama, X. Hu, Y. Hasegawa, T. Uchihashi, *Physical Review Letters*, (2014) (Editors' Suggestion) DOI: 10.1103/PhysRevLett.113.247004

b) Supercomputing in materials science: First-principles simulations of large molecules

--- *Large-scale calculation capable of handling material systems containing 100 to 1,000 times more atoms than conventional methods* ---

Matter is composed of atoms, and its physical properties are determined by the complex interactions between atoms and electrons. Theoreticians use quantum mechanics to calculate the forces between atoms, and the behavior of electrons in materials. Specifically, first-principles simulations are based on quantum mechanics, and are a powerful technique widely used to elucidate diverse properties of matter and materials at the atomic scale.

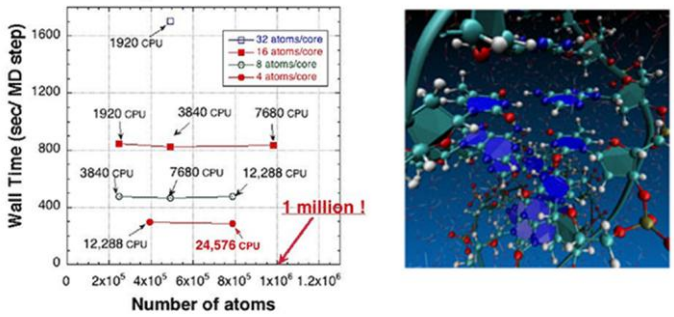

Fig. 4. (Left) Calculation time of O(N) first-principles calculation program run by the "K computer" (1 CPU = 8 cores). The calculations were performed on silicon systems. The horizontal axis shows the number of atoms, indicating that first-principles calculation of million atom systems is possible. The O(N) method combined with ideal parallel performance of the program (twice the number of CPUs achieving twice the amount of calculation) can calculate systems containing twice the number of atoms in the same time by doubling the number of CPUs. (Right) Snapshot structure from first-principles simulation of DNA in water medium using the calculation method developed by the research. The forces between atoms are calculated by first-principles calculation (joint research with RIKEN).

However, the size of the systems modelled with conventional first-principles methods is limited to only a few hundred atoms (in most cases) because the complexity and time required for simulations increases as the cube of the number of atoms being modelled. Now, a research team at MANA including

David Bowler and Tsuyoshi Miyazaki has successfully developed a highly efficient, large-scale first-principles simulation method for simulating the dynamics of very large systems, containing 100-1,000 times more atoms than conventional methods (up to millions of atoms) as shown in Fig.4. This method provides the means of performing atomic and electronic structure simulations of biological molecules and complex matter, including nanostructured materials, for which conventional methods cannot be used.

The research team has been pursuing the development of a calculation method capable of performing highly efficient large-scale simulations of dynamics. Here, by introducing a new technique where the time required increases linearly with the number of atoms and utilizing supercomputers, namely the "K computer" and FX10 installed at RIKEN and the University of Tokyo, respectively, the team successfully performed first-principles dynamical simulations of systems comprising more than 30,000 atoms, which is 100 times larger than is usual with conventional methods. Their success will pave the way for simulation of very large systems including up to millions of atoms.

Reference: "Stable and Efficient Linear Scaling First-Principles Molecular Dynamics for 10,000+ atoms", M. Arita, D. R. Bowler, T. Miyazaki, *Journal of Chemical Theory and Computation*, 10, 5419 (2014). DOI: 10.1021/ct500847y

2. Advancing fusion of various research fields

A) Introduction

MANA has promoted interdisciplinary research fusion strongly by operating "Fusion Research Fund", "Grand Challenge Research Fund", Theory-Experiment Fusion Research Fund" and "Nano-life Fusion Research Fund". As a result, various fusion researches have been actively performed at MANA. In the following, two examples performed in 2014 are described by picking up "life-science-inspired nanoarchitectonics" and "nanoarchitectonics-inspired life science".

B) Selected researches in 2014

a) Nanomechanical sensors for detecting cancer from breath

--- An array of functionalised membrane-type surface stress sensors (MSS) distinguishes cancer patients from healthy people through a signature response to breath samples. ---

Cancer is the cause of 1 in 8 deaths worldwide, and early diagnosis can significantly improve survival rates. A collaboration of the research team led by Genki Yoshikawa at MANA and Swiss scientists has developed portable cancer detection units for non-invasive diagnosis. "We created an artificial nose that is sensitive enough to diagnose head and neck cancer through analysis of the breath," the researchers concluded in a recent report on their work.

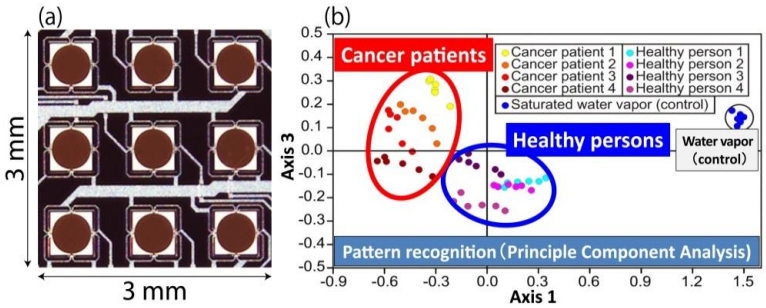

Fig. 5. Principal Component Analysis case scores for breath samples of 4 healthy persons and 4 cancer patients. Each sample has been measured 6 times (colored dots). A breath sample bag containing saturated water vapor has been measured as a control (blue dots). Healthy persons can be clearly distinguished from cancer patients (the ellipses are a guide to the eye).

The sensor design originates from conventional piezoresistive cantilever devices. Chemical layers coated on cantilevers absorb specific compounds and cause deflection of the cantilevers. These deflections can be measured through the change in electrical resistance at piezoresistors. However, these piezoresistive cantilever-type sensors have suffered from limited sensitivity. Recently, comprehensive structural optimization has led to a membrane-type surface stress sensor (MSS), achieving a significant improvement in sensitivity and stability. The MSS is composed of a thin silicon membrane (typically 2.5 μm thick and 500 μm in diameter) suspended by four piezoresistive beams attached to the circumference.

The research group fabricated an array of MSS and coated them with different polymers to absorb various chemical compounds in breath samples. Reporting at the 26th IEEE International Conference on Micro Electro Mechanical Systems (IEEE MEMS 2013), the research group presented that MSS could distinguish, in a double blind trial, the breath of four cancer patients from four healthy people (Fig.5).

References: "Piezoresistive membrane-type surface stress sensor arranged in arrays for cancer diagnosis through breath analysis", F. Loizeau, H. P. Lang, T. Akiyama, S. Gautsch, P. Vettiger, A. Tonin, G. Yoshikawa, Ch. Gerber, N. de Rooij, *Micro Electro Mechanical Syst*, DOI:10.1109/MEMSYS.2013.6474318

b) A simple way to treat kidney failure

--- A new technique for purifying blood using a nanofiber mesh could prove useful as a cheap, wearable alternative to kidney dialysis. ---

Kidney failure results in a build up of toxins and excess waste in the body. Dialysis is the most common treatment, performed daily either at home or in hospital. However, dialysis machines require electricity and careful maintenance, and are therefore more readily available in developed countries than poorer nations. Around one million people die each year worldwide from potentially preventable end-stage renal disease.

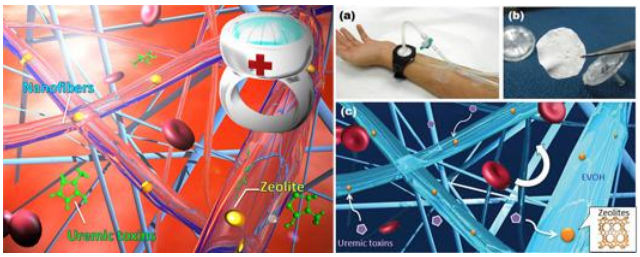

Fig. 6. The newly-fabricated nanofiber mesh for the removal of toxins from the blood, made by WPI-MANA researchers, may be incorporated into wearable blood purification systems for kidney failure patients.

In addition to this, in the aftermath of disasters such as the Japan Earthquake and Tsunami of 2011, dialysis patients are frequently left without treatment until normal hospital services are resumed. With this in mind, Mitsuhiro Ebara and co-workers at MANA, have developed a way of removing toxins and waste from blood using a cheap, easy-to-produce nanofiber mesh. The mesh could be incorporated into a blood purification product small enough to be worn on a patient's arm, reducing the need for expensive, time-consuming dialysis.

The team made their nanofiber mesh using two components: a blood-compatible primary matrix polymer made from polyethylene-co-vinyl alchohol, or EVOH, and several different forms of zeolites - naturally occurring aluminosilicates. Zeolites have microporous structures capable of adsorbing toxins such as creatinine from blood.

Although the new design is still in its early stages and not yet ready for production, Ebara and his team are confident that a product based on their nanofiber mesh will soon be a feasible, compact and cheap alternative to dialysis for kidney failure patients across the world (Fig. 6).

Reference: "Fabrication of zeolite-polymer composite nanofibers for removal of uremic toxins from

kidney failure patients", K. Namekawa, M. Tokoro Schreiber, T. Aoyagi, M. Ebara, *Biomaterials Science*, DOI: 10.1039/c3bm60263j

3. Globalization of the institution

* Describe what's been accomplished or recognized in the efforts to raise the center's international recognition as a genuine top world-level research institute, along with innovative efforts proactively being taken in accordance with the development stage of the center, including the following points, for example:
  - Efforts being developed based on the analysis of number and state of world-leading, frontline researchers; number and state of visiting 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 young researchers from around the world (such as efforts fostering young researchers and contributing to advancing their career paths)

In 2011, NIMS established the TU-NIMS Joint Research Center with Tianjin University, and MANA Principal Investigator, Dr. Jinhua Ye, currently serves as the director. Tianjin University invested approximately ¥200 million to build 500 m^2 of offices and lab space, and five Chinese researchers (two of whom used to work at MANA) and numerous students are conducting research on environment and energy materials under the supervision of PI Ye. The Center has actively engaged MANA in personnel and research exchange, and thus far, 77 international joint works (including 52 MANA-affiliated papers) have been published. In 2014, the Center was successfully selected for a national project on artificial photosynthesis and was awarded ¥300 million in research funding over five years from the Chinese government. This Center has contributed significantly to MANA's research achievements, and it is a successful example of MANA's mission to build a global network of nanotechnology research centers with MANA at the core. Maintaining MANA satellites after the conclusion of the WPI subsidy is an issue we must tackle, but the TU-NIMS Joint Research Center offers a direction in which we should proceed.

To produce internationally-minded, interdisciplinary young researchers, MANA supports young researchers by sending them overseas to conduct research at major foreign research institutions for long periods of time. In FY2014, four young researchers were sent to Pennsylvania State University, the University of Chicago, the University of Toronto and the University of Konstanz (in Germany), respectively, to study abroad for periods of 12 or 18 months. This action was taken in response to a comment in the FY2009 follow-up that stated "young researchers should be given opportunities to conduct research at premier foreign research institutes and universities for one to two years."

With regard to the international workshops on specific topics, we held the topology workshop in April (174 participants) and the nanostructures workshop in November (214 participants). This action was taken in response to a recommendation raised in the FY2013 follow-up, namely, that "challenging and long-term research ... will need more open discussions, brainstorming and collaborations with diverse scientists from outside of MANA and NIMS. We would like to recommend the holding of collaborative and brainstorming workshops."

At the spring meeting of the European Materials Research Society held in Lille, France from May 26 to May 30, the four WPI centers (i.e., MANA, AIMR, iCeMS and I^2CNER) showcased their research outcomes and programs by way of workshops, guest lectures, research presentations and booth displays. As the WPI organizer, MANA supervised all of these events.

4. Implementing organizational reforms

* If innovated system reforms generated by the center have had a ripple effect on other departments of the host institutions or on other research institutions, clearly describe in what ways.

The Administrative Office plays a major role in ensuring that MANA functions as a world-class research

center by devising and implementing policies pertaining to center operations, providing generous technical and administrative support to researchers, promoting global research exchange, widely disseminating the center's research output, and engaging and outreach activities. Under the next Seven-Year Plan, which will commence in April 2016, NIMS will establish Operations Offices patterned on the MANA Administrative Office in its other research centers in an effort to strengthen governance in the management of both research and administrative duties.

The WPI-MANA building, which was completed three years ago, was designed to emphasize the transparency of the offices and labs with glass walls and doors facing the hallways as well as freely accessible interaction spaces. Due to this this innovative design, we have successfully increased opportunities for cross-disciplinary and cross-cultural exchange among researchers and have invigorated the entire center. In March 2015, we completed construction on the Advanced Structural Materials Building in NIMS Sengen-site, whose design was patterned entirely on the WPI-MANA Building.

In this way, MANA's progressive initiatives in terms of both services and infrastructure have spilled over into NIMS.

5. Efforts to secure the center's future development over the mid- to long term

* Please address the following items, which are essential to mid- to long-term center development:
  - Future Prospects with regard to the research plan, research organization and PI composition; prospects for the fostering and securing of next-generation researchers
  - Prospects for securing resources such as permanent positions and revenues; plan and/or implementation for defining the center's role and/or positioning the center within the host institution's institutional structure
  - Measures to sustain the center as a world premier international research center after program funding ends (including measures of support by the host institution)

(1) Future Prospects with regard to the research plan, research organization and PI composition; prospects for the fostering and securing of next-generation researchers

NIMS's next seven-year plan will commence in April 2016, and we are currently conducting the necessary reviews of MANA's organizational structures and research fields. Under the next seven-year plan, MANA will remain a core research center in charge of one of NIMS's strategic research areas. We plan to establish a new field, Nano-Theory, and take measures to ensure that one-quarter of all MANA researchers are theoreticians.

At the same time, we plan to invigorate the PI ranks. In the first half of 2015, four PIs will resign from MANA PI, and we will select several younger researchers to serve as PIs in fiscal 2015.

(2) Prospects for securing resources such as permanent positions and revenues; plan and/or implementation for defining the center's role and/or positioning the center within the host institution's institutional structure.

Even after the aid-funded project concludes, NIMS has promised to provide MANA with the following research resources so that it can continue its basic activities. Approximately 90 core members of MANA, including PIs, Associate PIs, Group Leaders, MANA Scientists, Independent Scientists and administrative staffs, are assigned to MANA as NIMS permanent staff. Also, NIMS intends to cover MANA's necessary expenditures (totaling several hundreds of million yen per year), for research projects, MANA Foundry operating expenses, researcher invitation and dispatch expenses, utilities, and conducting basic research.

(3) Measures to sustain the center as a world premier international research center after program funding ends (including measures of support by the host institution)

We must replace the post-docs and other fixed-term researchers hired using the WPI subsidy with those

hired using external funding. To do this, we will work with NIMS in an effort to drastically increase the amount external funding we receive.

We will carry over administrative and technical research support, which is especially advanced at MANA, by establishing new Operations Offices in each Research Division and new technical support stations. However, since there is a limit to what we can do on our own accord, we seek support from the "WPI Academy" in order to maintain core functions essential to the World Premier International Center.

6. Others

* In addition to the above 1-5 evaluation items, only if there is anything else that deserves mention regarding the center project's progress, please note it.

In March 2015, two Principal Investigators, Dr. Aoyagi and Dr. Hasegawa, moved to Nihon University and Waseda University, respectively, and one Independent Scientist, Dr. Wakabayashi, moved to Kansei Gakuin University. During the FY2012 site visit, one of the reviewers said: "In the near future, MANA should considering becoming a supplier of human resources by sending outstanding Principle Investigators and post-doc researchers to other universities and research institutions in order to advance materials science both at home and abroad." This is what led to these transfers of senior level researchers.

Five MANA Principal Investigators—Dr. Ariga (Materials Science), Dr. Bando (Materials Science), Dr. Golberg (Materials Science), Dr. Wang (Materials Science, Chemistry), and Dr. Yaghi (Chemistry)—were selected for Thomson Reuters' *Highly Cited Researchers 2014*. The 2014 list contains approximately 3,200 highly cited researchers in 21 different research fields.

PI Ariga's introductory nanoarchitectonics textbook, *Materials Revolution: Nanoarchitectonics*, was published by Iwanami Science Library. Geared for a general readership, it provides clear explanations of topics such as atomic switches, which will pave the way for brain-like computers, photocatalysts, which aim to realize artificial photosynthesis, and biomaterials, which will contribute to advances in medical care.

7. Center's response to the results of the FY2014 follow-up (including the results of the site visit)

* Note how the center has responded to the results of FY2014 follow-up. However, if you have already provided this information, please indicate where in the report.

1) *Work is still needed in forming a solid program in the Nano-Life area that fits with the overall goals of MANA. The Nano-Life area is important to MANA because it strengthens efforts in the bio area in which important functional structures of biomedical and biophysical use are formed by innovative combinations of new and novel nanomaterials. This is also an area in which it seems that the incisive nano-probes developed at MANA can be used for the in-depth analysis of biological mechanisms at the nano-scale.*

MANA takes pride in its original Nano-Life research area. We are gradually developing this area as a fusion of our world-renowned nanotechnology (i.e., nanoarchitectonics) with life science (i.e., bioscience). To do this, we are taking two approaches to research and development: i) Nanotechnology-inspired Nano-Life research and ii) Nano-Life-inspired Nanotechnology. More specifically, we are working on a drug delivery method that uses smart nanofiber meshes to induce death in localized cancerous tissue and an ultra-sensitive molecular sensor that can instantaneously diagnose cancer and other diseases by analyzing the biomolecules contained in human breath.

2) *A convincing strategy to 'realize room-temperature superconductors', which has been raised as one of the Grand Challenges, should be clarified, particularly in view of nanoarchitectonics.*

Researchers around the globe, not just at MANA, are competing to achieve room-temperature superconductivity. Amid this backdrop, MANA is employing an original strategy to tackle this challenge. Namely, we are conducting intensive research into the use of the huge electric fields produced by solid electrolytes to artificially control the electronic states of the adjacent materials. This is a difficult challenge, but we have already obtained many promising results.

3) *It is necessary to define what 'practical' means in one of the four Grand Challenges, namely, 'practical artificial photosynthesis', and to devise a research strategy therefor. The meaning of 'practical' is still obscure.*

MANA has successfully achieved methane (CH_4) artificial photosynthesis, but efficiency remains an issue. What we mean by 'practical artificial photosynthesis' is that artificial photosynthesis techniques can be used to produced photosynthetic materials as practical sources of energy on a factory scale. To do this, we are investigating a range of methods. Taking a lesson from the fine structure of plant leaves, for example, we are conducting research on artificial photosynthetic systems and plasmonics that make effective use of sunlight.

4) *The scientists at MANA should continue to do fundamental research at the highest international level and should not look for short-term applications which may be important for successful grant applications necessary for the time after WPI support. Creating new knowledge in nanoarchitectonics is the best basis for new applications and innovations.*

MANA researchers are engaged in challenging, basic research under the goal of "pioneering a new paradigm of nanotechnology for new materials development". As with research on nanoarchitectonic artificial brains, one of the four Grand Challenges, MANA should pursue breakthrough-style research in which its original achievements contribute significantly to future innovations.

5) *As a national laboratory, MANA should address social needs by making the most of nanoarchitectonics in view of basic science.*

The numerous research outcomes produced thus far show that the concept of nanoarchitectonics that MANA has proposed is extremely useful in the development of innovative new materials and devices that humankind requires for sustainable development. Going forward, MANA will continue to promote research in light of societal needs while maintaining its focus on basic research.

6) *The organizational enhancement of the relationship between theory and experimental work is highly encouraged and should be successfully carried out.*

In April 2016, MANA plans to establish a Nano-Theory field and involve several dozen theoreticians in research at MANA. In anticipation of the establishment of this new field, MANA will commence its Theoretician-Experimentalists Partnership system one year early by launching theory-experiment fusion research projects in which theoretician and experimentalists cooperatively conduct joint research.

List of Center's Research Results and Main Awards

A. Refereed Papers

List only the Center's papers published in 2014. (Note: The list should be for the calendar year, not the fiscal year.)

(1) 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 the name of his/her WPI center). (*Not including* papers whose acknowledgements contain the names of persons affiliated with the WPI program.)

B. WPI-related papers
Among papers published in 2014, list those related to the WPI program 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 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. As some WPI-affiliated authors of papers published up to 2011 may not be aware of this requirement, their papers are treated as "WPI-related papers." From 2012, however, the authors' affiliations must be clearly noted and only category A papers will be listed.

Newly selected centers are to list papers under category C below (in addition to categories A and B above).

(2) Method of listing paper
- List only referred papers. Divide them into categories (e.g., original articles, reviews, proceedings).
- For each, write the author name(s); year of publication; journal name, volume, page(s), and article title. Any listing order may be used as long as format is the same. (The names of the center researchers do not need to be underlined.)
- If a paper has many authors (say, more than 20), all of their names do not need to be listed.
- If the papers are written in languages other than English, divide them into language categories when listing them.
- Assign a serial number to each paper to be used to identify it throughout the system.

(3) Submission of electronic data
- In addition to the above, for each paper provide a .cvs file output 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.)
- These files do not need to be divided into paper categories.

(4) Use in assessments
- The lists of papers will be used in assessing the state of WPI project's progress in FY 2014.
- They will be used as reference in analyzing the trends and states of research in all the WPI centers, not to evaluate individual researcher performance.
- The special characteristics of each research domain will be considered when conducting assessments.

(5) Additional documents
After all documents, including these paper listings, showing the state of research progress have been submitted, additional documents may be requested.

Order of Listing

A. WPI papers
1. Original articles
2. Review articles
3. Proceedings
4. Other English articles
5. Articles written in other than English

B. WPI-related papers

1. Original articles
2. Review articles
3. Proceedings
4. Other English articles
5. Articles written in other than English

A. WPI papers (488)

1. Original articles (460)

No.	Author names and details
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A051	D.G. de Oteyza, J.M. Garcia-Lastra, E. Goiri, A. El-Sayed, Y. Wakayama, J.E. Ortega, *Asymmetric Response toward Molecular Fluorination in Binary Copper-Phthalocyanine/Pentacene Assemblies*, Journal of Physical Chemistry C **118**(32), 18626 (2014). doi: 10.1021/jp506151j
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A053	F. Delbecq, K. Kawakami, *Self-assembly study and formation of hydrophobized PVA dense and stable nanoparticles loaded with cholesterol or a steroid-type drug*, Journal of Colloid and Interface Science **428**, 57 (2014). doi: 10.1016/j.jcis.2014.04.037
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A455	M. Yamamoto, S.T. Wang, M.Y. Ni, Y.F. Lin, S.L. Li, S. Aikawa, W.B. Jian, K. Ueno, K. Wakabayashi, K. Tsukagoshi, *Strong Enhancement of Raman Scattering from a Bulk-Inactive Vibrational Mode in Few-Layer $MoTe_2$*, ACS Nano **8**(4), 3895 (2014). doi: 10.1021/nn5007607
A456	Y. Yamauchi, S. Ishihara, N. Suzuki, K.C.W. Wu, *Lithography-assisted alignment control for preparation of mesoporous silica films with uniaxially oriented mesochannels*, Chemical Communications **50**(19), 2448 (2014). doi: 10.1039/c3cc47667g
A457	S. Yanagisawa, A. Takeda, K. Inagaki, I. Hamada, Y. Morikawa, *Search for a Self-Regenerating Perovskite Catalyst with Ab Initio Thermodynamics II: Cu-Doped Layered Perovskites with K_2NiF_4 Structure*, Catalysis Letters **144**(4), 736 (2014). doi: 10.1007/s10562-014-1215-7
A458	S. Yanagisawa, K. Yamauchi, T. Inaoka, T. Oguchi, I. Hamada, *Origin of the band dispersion in a metal phthalocyanine crystal*, Physical Review B **90**(24), 245141 (2014). doi: 10.1103/PhysRevB.90.245141
A459	J.S. Yang, J. Deng, C. Troadec, T. Ondarçuhu, C. Joachim, *Solid-state SiO_2 nano-gears AFM tip manipulation on HOPG*, Nanotechnology **25**(46), 465305 (2014). doi: 10.1088/0957-4484/25/46/465305
A460	Y. Yang, C. Liu, S. Gao, Y. Li, X.R. Wang, Y. Wang, T. Minari, Y. Xu, P. Wang, Y. Zhao, K. Tsukagoshi, Y. Shi, *Large [6,6]-phenyl C-61 butyric acid methyl (PCBM) hexagonal crystals grown by solvent-vapor annealing*, Materials Chemistry and Physics **145**(3), 327 (2014). doi: 10.1016/j.matchemphys.2014.02.017
A461	Y.J. Yang, Y.T. Zhong, X. Wang, Y. Ma, J.N. Yao, *Facile Synthesis of Ultrathin Lepidocrocite Nanosheets from Layered Precursors*, Chemistry - An Asian Journal **9**(6), 1563 (2014). doi: 10.1002/asia.201301704

A462	H.H.M. Yeung, M. Kosa, J.M. Griffin, C.P. Grey, D.T. Major, A.K. Cheetham, *Topotactic elimination of water across a C-C ligand bond in a dense 3-D metal-organic framework*, Chemical Communications **50**(87), 13292 (2014). doi: 10.1039/c4cc06136e
A463	W. Yi, Y. Kumagai, N.A. Spaldin, Y. Matsushita, A. Sato, I.A. Presniakov, A.V. Sobolev, Y.S. Glazkova, A.A. Belik, *Perovskite-Structure $TlMnO_3$: A New Manganite with New Properties*, Inorganic Chemistry **53**(18), 9800 (2014). doi: 10.1021/ic501380m
A464	W. Yi, Y. Matsushita, A. Sato, K. Kosuda, M. Yoshitake, A.A. Belik, $Bi_3Cr_{2.91}O_{11}$: *A Ferromagnetic Insulator from Cr^{4+}/Cr^{5+} Mixing*, Inorganic Chemistry **53**(16), 8362 (2014). doi: 10.1021/ic500773b
A465	M. Yoshida, T. Yomogida, T. Mineo, K. Nitta, K. Kato, T. Masuda, H. Nitani, H. Abe, S. Takausagi, T. Uruga, K. Asakura, K. Uosaki, H. Kondoh, *Photoexcited Hole Transfer to a MnO_x Cocatalyst on a $SrTiO_3$ Photoelectrode during Oxygen Evolution Studied by In Situ X-ray Absorption Spectroscopy*, Journal of Physical Chemistry C **118**(42), 24302 (2014). doi: 10.1021/jp507657p
A466	G. Yoshikawa, C.J.Y. Lee, K. Shiba, *Effects of Coating Materials on Two Dimensional Stress-Induced Deflection of Nanomechanical Sensors*, Journal of Nanoscience and Nanotechnology **14**(4), 2908 (2014). doi: 10.1166/jnn.2014.8604
A467	K. Yoshimatsu, T. Yamazaki, Y. Hoshino, P.E. Rose, L.F. Epstein, L.P. Miranda, P. Tagari, J.M. Beierle, Y. Yonamine, K.J. Shea, *Epitope Discovery for a Synthetic Polymer Nanoparticle: A New Strategy for Developing a Peptide Tag*, Journal of the American Chemical Society **136**(4), 1194 (2014). doi: 10.1021/ja410817p
A468	M. Yoshitake, *Generic trend of work functions in transition-metal carbides and nitrides*, Journal of Vacuum Science and Technology A **32**(6), 061403 (2014). doi: 10.1116/1.4901014
A469	T. Yoshitomi, K. Kuramochi, L.B. Vong, Y. Nagasaki, *Development of nitroxide radicals-containing polymer for scavenging reactive oxygen species from cigarette smoke*, Science and Technology of Advanced Materials **15**(3), 035002 (2014). doi: 10.1088/1468-6996/15/3/035002
A470	T. Yoshitomi, Y. Nagasaki, *Reactive Oxygen Species-Scavenging Nanomedicines for the Treatment of Oxidative Stress Injuries*, Advanced Healthcare Materials **3**(8), 1149 (2014). doi: 10.1002/adhm.201300576
A471	T. Yoshitomi, S. Sha, L.B. Vong, P. Chonpathompikunlert, H. Matsui, Y. Nagasaki, *Indomethacin-loaded redox nanoparticles improve oral bioavailability of indomethacin and suppress its small intestinal inflammation*, Therapeutic Delivery **5**(1), 29 (2014). doi: 10.4155/tde.13.133
A472	K. Yoshizawa, T. Taguchi, *Enhanced Bonding Strength of Hydrophobically Modified Gelatin Films on Wet Blood Vessels*, International Journal of Molecular Sciences **15**(2), 2142 (2014). doi: 10.3390/ijms15022142
A473	K. Yoshizawa, T. Taguchi, *Bonding behavior of hydrophobically modified gelatin films on the intestinal surface*, Journal of Bioactive and Compatible Polymers **29**(6), 560 (2014). doi: 10.1177/0883911514553731
A474	S. Yoshizawa, H. Kim, T. Kawakami, Y. Nagai, T. Nakayama, X. Hu, Y. Hasegawa, T. Uchihashi, *Imaging Josephson Vortices on the Surface Superconductor Si(111)-(root 7 x root 3)-In using a Scanning Tunneling Microscope*, Physical Review Letters **113**(24), 247004 (2014). doi: 10.1103/PhysRevLett.113.247004
A476	P. Yuan, N. Zhang, D. Zhang, T. Liu, L.M. Chen, X.H. Liu, R.Z. Ma, G.Z. Qiu, *Fabrication of nickel-foam-supported layered zinc-cobalt hydroxide nanoflakes for high electrochemical performance in supercapacitors*, Chemical Communications **50**(76), 11188 (2014). doi: 10.1039/c4cc05057f

A477	Y. Yuan, H.L. Feng, Y. Shi, Y. Tsujimoto, A.A. Belik, Y. Matsushita, M. Arai, J. He, M. Tanaka, K. Yamaura, *High-pressure synthesis, crystal structure, and magnetic properties of $KSbO_3$-type 5d oxides $K_{0.84}OsO_3$ and $Bi_{2.93}Os_3O_{11}$*, Science and Technology of Advanced Materials **15**(6), 064901 (2014). doi: 10.1088/1468-6996/15/6/064901
A478	K. Yubuta, T. Mori, A. Leithe-Jasper, H. Bormann, Y. Grin, S. Okada, T. Shishido, *Intergrowth structure of alpha-phase in beta-type $TmAlB_4$ compound studied by high-angle annular detector dark-field scanning transmission electron microscopy*, Journal of Solid State Chemistry **219**, 274 (2014). doi: 10.1016/j.jssc.2014.07.038
A479	M.B. Zakaria, M. Hu, N. Hayashi, Y. Tsujimoto, S. Ishihara, M. Imura, N. Suzuki, Y.Y. Huang, Y. Sakka, K. Ariga, K.C.W. Wu, Y. Yamauchi, *Thermal Conversion of Hollow Prussian Blue Nanoparticles into Nanoporous Iron Oxides with Crystallized Hematite Phase*, European Journal of Inorganic Chemistry **2014**(7), 1137 (2014). doi: 10.1002/ejic.201301307
A480	M.B. Zakaria, M. Hu, M. Imura, R.R. Salunkhe, N. Umezawa, H. Hamoudi, A.A. Belik, Y. Yamauchi, *Single-Crystal-like Nanoporous Spinel Oxides: A Strategy for Synthesis of Nanoporous Metal Oxides Utilizing Metal-Cyanide Hybrid Coordination Polymers*, Chemistry - A European Journal **20**(52), 17375 (2014). doi: 10.1002/chem.201404054
A481	M.B. Zakaria, M. Hu, Y. Tsujimoto, Y. Sakka, N. Suzuki, Y. Kamachi, M. Imura, S. Ishihara, K. Ariga, Y. Yamauchi, *Controlled Crystallization of Cyano-Bridged Cu-Pt Coordination Polymers with Two-Dimensional Morphology*, Chemistry - An Asian Journal **9**(6), 1511 (2014). doi: 10.1002/asia.201400097
A482	O.V. Zamurueva, G.L. Myronchuk, G. Lakshminarayana, O.V. Parasyuk, L.V. Piskach, A.O. Fedorchuk, N.A. Al Zayed, A.M. El-Naggar, I.V. Kityk, *Structural and optical features of novel $Tl_{1-x}In_{1-x}Ge_xSe_2$ chalcogenide crystals*, Optical Materials **37**, 614 (2014). doi: 10.1016/j.optmat.2014.08.004
A483	C. Zhang, W. Tian, Z. Xu, X. Wang, J.W. Liu, S.L. Li, D.M. Tang, D.Q. Liu, M.Y. Liao, Y. Bando, D. Golberg, *Photosensing performance of branched CdS/ZnO heterostructures as revealed by in situ TEM and photodetector tests*, Nanoscale **6**(14), 8084 (2014). doi: 10.1039/c4nr00963k
A484	H.X. Zhang, Y. Sasaki, M. Abe, Y. Zhang, S. Ye, M. Osawa, K. Uosaki, *Electrochemical and infrared spectroscopic study of the self-assembled monolayer of a cyano-bridged dimeric triruthenium complex on gold surface*, Journal of Electroanalytical Chemistry **714**, 51 (2014). doi: 10.1016/j.jelechem.2013.12.012
A485	Q. Zhang, H.X. Lu, N. Kawazoe, G. Chen, *Pore size effect of collagen scaffolds on cartilage regeneration*, Acta Biomaterialia **10**(5), 2005 (2014). doi: 10.1016/j.actbio.2013.12.042
A486	Q. Zhang, T. Nakamoto, S.W. Chen, N. Kawazoe, K.L. Lin, J. Chang, G.P. Chen, *Collagen/Wollastonite Nanowire Hybrid Scaffolds Promoting Osteogenic Differentiation and Angiogenic Factor Expression of Mesenchymal Stem Cells*, Journal of Nanoscience and Nanotechnology **14**(4), 3221 (2014). doi: 10.1166/jnn.2014.8607
A487	X.X. Zhang, J.P. He, T. Wang, M.Z. Liu, H.R. Xue, H. Guo, *Synthesis of ordered mesoporous carbon doped with carbon nanotubes and a new strategy to use it as a support for Pt electrocatalysts*, Journal of Materials Chemistry A **2**(9), 3072 (2014). doi: 10.1039/c3ta13732e
A488	X. Zhang, W. Yi, K. Feng, D.S. Wu, Y.F. Yang, P. Zheng, J.Y. Yao, Y. Matsushita, A. Sato, H.W. Jiang, H. Wang, Y.G. Shi, K. Yamaura, N.L. Wang, *Crystal Growth, Structural, Electrical, and Magnetic Properties of Mixed-Valent Compounds $YbOs_2Al_{10}$ and $LuOs_2Al_{10}$*, Inorganic Chemistry **53**(9), 4387 (2014). doi: 10.1021/ic403168v

2. Review articles (19)

No.	Author names and details
A014	K. Ariga, T. Mori, S. Ishihara, K. Kawakami, J.P. Hill, *Bridging the Difference to the Billionth-of-a-Meter Length Scale: How to Operate Nanoscopic Machines and Nanomaterials by Using Macroscopic Actions*, Chemistry of Materials **26**(1), 519 (2014). doi: 10.1021/cm401999f
A016	K. Ariga, Y. Yamauchi, G. Rydzek, Q.M. Ji, Y. Yonamine, K.C.W. Wu, J.P. Hill, *Layer-by-layer Nanoarchitectonics: Invention, Innovation, and Evolution*, Chemistry Letters **43**(1), 36 (2014). doi: 10.1246/cl.130987
A031	A.A. Belik, W. Yi, *High-pressure synthesis, crystal chemistry and physics of perovskites with small cations at the A site*, Journal of Physics: Condensed Matter **26**(16), 163201 (2014). doi: 10.1088/0953-8984/26/16/163201
A087	B. Ghosh, N. Shirahata, *Colloidal silicon quantum dots: synthesis and luminescence tuning from the near-UV to the near-IR range*, Science and Technology of Advanced Materials **15**(1), 014207 (2014). doi: 10.1088/1468-6996/15/1/014207
A107	J.P. Hill, L.K. Shrestha, S. Ishihara, Q.M. Ji, K. Ariga, *Self-Assembly: From Amphiphiles to Chromophores and Beyond*, Molecules **19**(6), 8589 (2014). doi: 10.3390/molecules19068589
A131	Y. Ide, M. Sadakane, T. Sano, M. Ogawa, *Functionalization of Layered Titanates*, Journal of Nanoscience and Nanotechnology **14**(3), 2135 (2014). doi: 10.1166/jnn.2014.8525
A133	Y. Ikeda, Y. Nagasaki, *Impacts of PEGylation on the Gene and Oligonucleotide Delivery System*, Journal of Applied Polymer Science **131**(9), 40293 (2014). doi: 10.1002/app.40293
A152	B. Joddar, T. Hoshiba, C.P. Chen, Y. Ito, *Stem cell culture using cell-derived substrates*, Biomaterials Science **2**(11), 1595 (2014). doi: 10.1039/c4bm00126e
A202	Y. Li, H.B. Sun, Y. Shi, K. Tsukagoshi, *Patterning technology for solution-processed organic crystal field-effect transistors*, Science and Technology of Advanced Materials **15**(2), 024203 (2014). doi: 10.1088/1468-6996/15/2/024203
A266	J. Nakanishi, *Switchable Substrates for Analyzing and Engineering Cellular Functions*, Chemistry – An Asian Journal **9**(2), 406 (2014). doi: 10.1002/asia.201301325
A268	W. Nakanishi, K. Minami, L.K. Shrestha, Q.M. Ji, J.P. Hill, K. Ariga, *Bioactive nanocarbon assemblies: Nanoarchitectonics and applications*, Nano Today **9**(3), 378 (2014). doi: 10.1016/j.nantod.2014.05.002
A302	A. Pakdel, Y. Bando, D. Golberg, *Nano boron nitride flatland*, Chemical Society Reviews **43**(3), 934 (2014). doi: 10.1039/c3cs60260e
A316	M. Ramanathan, K.L. Hong, Q.M. Ji, Y. Yonamine, J.P. Hill, K. Ariga, *Nanoarchitectonics of Molecular Aggregates: Science and Technology*, Journal of Nanoscience and Nanotechnology **14**(1), 390 (2014). doi: 10.1166/jnn.2014.8766

A330	R.R. Salunkhe, Y.H. Lee, K.H. Chang, J.M. Li, P. Simon, J. Tang, N.L. Torad, C.C. Hu, Y. Yamauchi, *Nanoarchitectured Graphene-Based Supercapacitors for Next-Generation Energy-Storage Applications*, Chemistry - A European Journal **20**(43), 13838 (2014). doi: 10.1002/chem.201403649
A370	A.Z. Stieg, A.V. Avizienis, H.O. Sillin, C. Martin-Olmos, M.L. Lam, M. Aono, J.K. Gimzewski, *Self-organized atomic switch networks*, Japanese Journal of Applied Physics **53**(1), 01AA02 (2014). doi: 10.7567/JJAP.53.01AA02
A388	J. Tang, J. Liu, N.L. Torad, T. Kimura, Y. Yamauchi, *Tailored design of functional nanoporous carbon materials toward fuel cell applications*, Nano Today **9**(3), 305 (2014). doi: 10.1016/j.nantod.2014.05.003
A420	Y. Wakayama, R. Hayakawa, H.S. Seo, *Recent progress in photoactive organic field-effect transistors*, Science and Technology of Advanced Materials **15**(2), 024202 (2014). doi: 10.1088/1468-6996/15/2/024202
A422	L.Z. Wang, T. Sasaki, *Titanium Oxide Nanosheets: Graphene Analogues with Versatile Functionalities*, Chemical Reviews **114**(19), 9455 (2014). doi: 10.1021/cr400627u
A428	X. Wang, W. Tian, M.Y. Liao, Y. Bando, D. Golberg, *Recent advances in solution-processed inorganic nanofilm photodetectors*, Chemical Society Reviews **43**(5), 1400 (2014). doi: 10.1039/C3CS60348B

3. Proceedings (6)

No.	Author names and details
A139	R. Ishiguro, T. Sakurai, M. Yakabe, T. Nakamura, S. Yonezawa, S. Kashiwaya, H. Takayanagi, Y. Maeno, *Broken time-reversal symmetry in a SQUID based on chiral superconducting Sr_2RuO_4*, Journal of Physics: Conference Series **568**(2), 022020 (2014). doi: 10.1088/1742-6596/568/2/022020
A140	R. Ishiguro, E. Watanabe, T. Shinozaki, Y. Nago, H. Osato, D. Tsuya, H. Kashiwaya, S. Kashiwaya, S. Nomura, H. Takayanagi, Y. Maeno, *Development of nano and micro SQUIDs based on Al tunnel junctions*, Journal of Physics: Conference Series **568**(2), 022019 (2014). doi: 10.1088/1742-6596/568/2/022019
A162	T. Kawakami, Y. Nagai, S. Yoshizawa, H. Kim, Y. Hasegawa, T. Nakayama, T. Uchihashi, X. Hu, *Excitation spectrum of Josephson vortices on surface superconductor*, Journal of Physics: Conference Series **568**(2), 022022 (2014). doi: 10.1088/1742-6596/568/2/022022
A257	K. Nagaoka, S. Yaginuma, T. Nakayama, *STS study of 2D subband state formed in the space charge layer of Si(111)-β √3 × √3-Bi*, e-Journal of Surface Science and Nanotechnology **12**, 217 (2014). doi: 10.1380/ejssnt.2014.217
A262	Y. Nago, R. Ishiguro, T. Sakurai, M. Yakabe, T. Nakamura, S. Yonezawa, H. Takayanagi, Y. Maeno, *Superconducting transition of Ru in SQUIDs with Nb/Ru/Sr_2RuO_4 junctions*, Journal of Physics: Conference Series **568**(2), 022031 (2014). doi: 10.1088/1742-6596/568/2/022031
A363	A. Sobolev, I. Presniakov, A. Belik, M. Matsnev, D. Gorchakov, I. Glazkova, *Mössbauer investigations of hyperfine interactions features of ^{57}Fe nuclei in $BiFeO_3$ ferrite*, AIP Conference Proceedings **1622**, 104 (2014). doi: 10.1063/1.4898617

4. Other English articles (3)

No.	Author names and details
A089	D. Golberg, C. Zhang, Z. Xu, *Cubic Lattice Nanosheets: Thickness-Driven Light Emission*, ACS Nano **8**(7), 6516 (2014). doi: 10.1021/nn502999g
A307	V.T. Pham, M. Dutta, H.T. Bui, N. Fukata, *Effect of nanowire length on the performance of silicon nanowires based solar cell*, Advances in Natural Sciences: Nanoscience and Nanotechnology **5**(4), 045014 (2014). doi: 10.1088/2043-6262/4/3/035007
A475	S. Yoshizawa, T. Uchihashi, *Superconducting Phase Transition of the Si(111)-(root 7 x root 3)-In Surface: Solution of T-c Discrepancy*, Journal of the Physical Society of Japan **83**(6), 065001 (2014). doi: 10.7566/JPSJ.83.065001

B. Invited Lectures, Plenary Addresses (etc.) at International Conferences and International Research Meetings
- List up to 10 main presentations during FY2014 in order from most recent.
- For each, write the lecturer/presenter's name, presentation title, conference name and date(s)

No.	Lecturer/presenter names and details
1	Yusuke YAMAUCH *Chemical Design of Functional Nanoporous Materials toward Electrochemical Applications* EMNT2014, Okinawa, Japan 5-8 November 2014
2	Naoki FUKATA *Segregation and interaction of boron and phosphorus impurities in silicon nanowires during low temperature ozone oxidation* Nanowire 2014, Eindhoven, Netherlands 25-29 August 2014
3	Dmitri GOLBERG *Nanostructure properties analysis using in-situ TEM* 15th IUMRS-International Conference in Asia (IUMRS-ICA-2014), Fukuoka, Japan 24-30 August 2014
4	Katsuhiko ARIGA *Novel Nanocarbon Self-Assemly: Fullerene Nanowhisker Array, Bucky Cube, and Carbon Capsule Film* XXIII International Materials Research Congress, IMRC2014, Cancun, Mexico 17-20 August 2014
5	Katsunori WAKABAYASHI *Nanoscale and edge effects on the electronic properties of grapheme* International Union of Crystallography (IUCr) 2014, Montreal, Canada 5-12 August 2014
6	Xiao HU *Multi-Band Superconductivity with Broken Time Reversal Symmetry* 10th International Workshop on Nanomagnetism and Superconductiv, Coma Ruga, Spain June 30 - July 4 2014
7	Tsuyoshi HASEGAWA *Novel functions achieved by atom/ion movement controlled devices* CIMTEC 2014, Montecatini Terme, Italy 8-20 June 2014
8	Takayoshi SASAKI *Solution-based 2D Nanoarchitectonics with Oxide Nanosheets and Function Design* Euro-MRS, Lille, France 26-30 May 2014
9	Masakazu AONO *Nanoelectroionics to Open New Horizons of Materials Science and Technology* Elecnano6, Paris, France 26-28 May 2014
10	Jinhua YE *Control of Surface/interface Structures of Nano Metal/Semiconductors for Efficient Solar Chemical Conversion* 2014 MRS Spring Meeting, San Francisco, USA 21-25 April 2014

C. Major Awards
- List up to 10 main awards received during FY2014 in order from the most recent.
- For each, write the recipient's name, name of award, and year issued.
- In case of multiple recipients, underline those affiliated with the center.

No.	Recipient names and details
1	Jin KAWAKITA The Japan Institute of Metals and Materials Meritorious Award （by The Japan Institute of Metals and Materials） 2015
2	Guoping CHEN Fellow of the Royal Society of Chemistry （by The Royal Society, UK） 2015
3	Daiming TANG Award for Encouragement of Research （by The IUMRS-ICA2014 ） 2014
4	Kazuhito TSUKAGOSHI The 36th Award for the Best Original Paper （by The Japan Society of Applied Physics） 2014
5	Katsuhiko ARIGA Highly Cited Researchers in Materials Science for 2014 （by The Thomson Reuters） 2014
6	Yoshio BANDO Highly Cited Researchers in Materials Science for 2014 （by The Thomson Reuters） 2014
7	Dmitri GOLBERG Highly Cited Researchers in Materials Science for 2014 （by The Thomson Reuters） 2014
8	Dmitri GOLBERG The 59th Seto Award （by The Japanese Society of Microscopy） 2014
9	Takako KOUNOIKE Young Scientist Award （by The Japan Society of Physics） 2014
10	Satoshi ISHI The 13rd Funai Research Promotion Award （by The Funai Foundation） 2014

FY 2014 List of Principal Investigators

NOTE:
・Underline names of principal investigators who belong to an overseas research institution.
・In case of researchers not listed in the latest report, attach "Biographical Sketch of a New Principal Investigator".

<Results at the end of FY2014>

Principal Investigators Total:22

Name (Age)	Affiliation (Position title, department, organization)	Academic degree, specialty	Working hours (Total working hours: 100%)				Starting date of project participation	Status of project participation (Describe in concrete terms)	Contributions by PIs from overseas research institutions
			Work on center project		Others				
			Research activities	Other activities	Research activities	Other activities			
Director-General AONO, Masakazu (70)	Director-General, International Center for Materials Nanoarchitectonics (MANA)	Ph.D. University of Tokyo, 1972 NanoSciene and nanotechnology	60%	15%	15%	10%	10/1/2007	a) usually stays at the center	–
BANDO, Yoshio (67)	Chief Operating Officer, International Center for Materials Nanoarchitectonics (MANA)	Ph.D. Osaka University, 1975 Nanomaterials and transmission electron microscope	70%	30%	0%	0%	10/1/2007	a) usually stays at the center	–
SASAKI, Takayoshi (59)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. (Science) University of Tokyo, 1986 Nanosheet and soft chemistry	100%	0%	0%	0%	10/1/2007	a) usually stays at the center	–
ARIGA, Katsuhiko (52)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. Tokyo Inst. Tech., 1990 Supramolecular chemistry and surface science	100%	0%	0%	0%	10/1/2007	a) usually stays at the center	–

CHIKYOW, Toyohiro (55)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. Waseda University, 1989 Semiconductor and electric materials	70%	10%	10%	10%	4/1/2011	a) usually stays at the center	–
GOLBERG, Dmitri (54)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. Moscow Institute for Ferrous Metallurgy, 1990 Nanotubes and nanowires	100%	0%	0%	0%	10/1/2007	a) usually stays at the center	–
WANG, Zhong Lin (53)	Professor, School of Materials Science and Engineering, Georgia Institute of Technology	Ph.D. Arizona State University, 1987 Nano chemistry and nanodevices	15%	5%	60%	20%	10/1/2007	b) stays at the center twice a year, usually at GIT satellite	To conduct research themes of MANA and to accept a young researcher from MANA (1 month)
GIMZEWSKI, James K. (63)	Dinstinguished Professor, Chemistry & Biochem. Dept., UCLA Director, Nano/Pico Characterization Lab, UCLA California NanoSystems Inst.	Ph.D. (Physical Chemistry) Univ. of Strathclyde, 1977 Nanoscience and nanobio	23%	3%	67%	7%	10/1/2007	b) stays at the center several times a year, usually at UCLA satellite	To conduct research themes of MANA
HASEGAWA, Tsuyoshi (52)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. (Science) Tokyo Inst. Tech., 1996 Nano-devices	100%	0%	0%	0%	10/1/2007	a) usually stays at the center	–
HU, Xiao (53)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. (Physics) University of Tokyo, 1990 Condensed matter physics	100%	0%	0%	0%	10/1/2007	a) usually stays at the center	–

JOACHIM Christian (57)	Centre National de la Recherche Scientifique (CNRS) Lab: CEMES (UPR8011) Toulouse (France)	Ph.D. in Applied Mathematic Ph.D. in Quantum physics, computer science and nanoscience	18%	3%	72%	7%	10/1/2007	b) stays at the center several times a year, usually at CNRS satellite	To conduct research themes of MANA
NAKAYAMA, Tomonobu (53)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. in physics University of Tokyo,1999 Scanning probe microscopy	100%	0%	0%	0%	10/1/2008	a) usually stays at the center	–
TAKAYANAGI, Hideaki (63)	Professor, Tokyo University of Science, Research Institute for Science and Technology	Ph.D. (science) University of Tokyo, 1987 Mesoscopic superconductivity and quantum information physics	50%	10%	20%	20%	10/1/2007	b) stays at the center for six days a month	–
TSUKAGOSHI, Kazuhito (47)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. Osaka University,1995 Nano electronics	90%	0%	10%	0%	1/1/2009	a) usually stays at the center	–
YE, Jinhua (52)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. University of Tokyo, 1990 Photocatalyst, eco-materials	30%	0%	50%	20%	10/1/2007	a) usually stays at the center	–
TAKADA, Kazunori (53)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. Osaka University, 1986 Solid-state chemistry	30%	0%	70%	0%	1/1/2010	a) usually stays at the center	–

UOSAKI, Kohei (68)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. Flinders Univ., 1977 Surface physical chemistry	80%	20%	0%	0%	7/1/2008	a) usually stays at the center	–
YAGHI, Omar (50)	The James and Neeltje Tretter Professor of Chemistry, UC Berkley	Ph.D. University of Illinois, 1990 Nanostructure of organic materials	30%	0%	60%	10%	3/10/2008	b) usually stays at UCB c) holds a videoconference from UCB once a week.	To conduct research themes of MANA and to supervise a research group of MANA
AOYAGI, Takao (55)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. Tokyo Inst. Tech., 1993 Biomaterials	70%	0%	20%	10%	9/1/2010	a) usually stays at the center	–
CHEN, Guoping (49)	International Center for Materials Nanoarchitectonics (MANA)	Ph.D. Kyoto University, 1997 Biomaterials and tissue engineering	100%	0%	0%	0%	4/1/2011	a) usually stays at the center	–
NAGASAKI, Yukio (55)	Professor, Department of Materials Science and Master's Master's School of Medical Sciences, University of Tsukuba	Ph.D. Tokyo University of Science, 1986 Biomaterials and polymer chemistry	20%	0%	70%	10%	10/1/2007	b) usually stays at the University of Tsukuba satellite	–
Françoise M. Winnik (63)	Faculty of Pharmacy and Department of Chemistry, University of Montreal, Canada	Ph.D. (Chemistry) Univ. of Toronto, 1979 Polymer chemistry and photochemistry	40%	10%	40%	10%	4/1/2011	b) stays at the center for five months a year	To conduct research themes of MANA

Researchers unable to participate in project in FY 2014

Name	Affiliation (Position title, department, organization)	Starting date of project participation	Reasons	Measures taken

Records of FY2014 Center Activities

1. Researchers and center staffs, satellites, partner institutions

1-1. Number of researchers in the "core" established within the host institution

- Enter the total number of people in the columns below. In the "Researchers" column, put the number and percentage of overseas researchers in the < > brackets and the number and percentage of female researchers in the [ ] brackets.
- In the "Administrative staffs" column, put the number and percentage of bilingual staffs in the ( ) brackets.
- In the "Final Goal" column, enter the currently projected goal at [OO month, OO year (next year of the end of WPI grant)].

	Goal set in the "Post-interim evaluation revised center project"	Results at end of FY 2014	Final goal (Date: month, year)
Researchers	200 < 120, 60%> [50, 25%]	208 < 107, 51.44%> [39, 18.75%]	200 < 120, 60%> [50, 25%]
Principal investigators	25 < 10, 40%> [3, 12%]	22 < 8, 36.36%> [2, 9.09%]	25 < 10, 40%> [3, 12%]
Other researchers	175 < 110, 63%> [47, 27%]	186 < 99, 53.23%> [37, 19.89%]	175 < 110, 63%> [47, 27%]
Research support staffs	12	11	12
Administrative staffs	18	20 (20, 100%)	18 (18, 100%)
Total	230	239	230

Other matters of special mention

- Enter matters warranting special mention, such as concrete plans for achieving the Center's goals, established schedules for employing main researchers, particularly principal investigators.
- As background to how the Center is working to mobilize/circulate the 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.

Implementation of Nano-Theory field:

Prior to the implementation of Nano-Theory field in 2016, MANA is now under a selection procedure to choose several challenging proposals regarding theory-experiment fusion research from many proposals.

Researchers and others transferred from MANA:

Dr. Takao Aoyagi moved to Nihon University (Worked as PI at MANA: 2007.10-2015.3)
Dr. Tsuyoshi Hasegawa moved to Waseda University (Worked as PI at MANA: 2007.10-2015.3)
Dr. Katsunori Wakabayashi moved to Kansei-Gakuin University
(Worked as an Independent Scientist at MANA: 2007.10-2015.3)

Mr. Takahiro Fujita became Executive Vice President of the host institution, NIMS
(Worked as Administrative Director at MANA: 2007.10-2015.3)

Researchers transferred to MANA:

Dr. Satoshi Ishii transferred from National Institute of Information and Communication Technology
(Started as a MANA scientist at MANA: 2014.6)

Dr. Takaaki Taniguchi transferred from Kumamoto University
(Started as a MANA scientist at MANA: 2015.2)

1-2. Satellites and partner institutions

- List the satellite and partner institutions in the table below.
- Indicate newly added and deleted institutions in the "Notes" column.
- If satellite institutions have been established, describe by satellite the Center's achievements in coauthored papers and researcher exchanges in Appendix 4.

<Satellite institutions>

Institution name	Principal Investigator(s), if any	Notes
University of Tsukuba	Yukio Nagasaki	
Tokyo University of Science	Hideaki Takayanagi	Close this satellite in the end of FY2014
UCLA, USA	James K. Gimzewski	
Georgia Institute of Technology, USA	Zhong Lin Wang	
University of Montreal, Canada	Francoise M. Winnik	
University College London	David Bowler	
Centre National de la Recherche Scientifique	Christian Joachim	

< Partner institutions>

Institution name	Principal Investigator(s), if any	Notes
Kent State University, Department of Chemistry, USA		deleted
Rensselaer Polytechnic Institute, Chemistry and Biological Engineering, USA		deleted
University of Cambridge, Nanoscience Centre, UK		deleted
Indian Institute of Chemical Technology (IICT), India		deleted
University of Basel, Institute of Physics, National Center of Competence for Nanoscale Science, Switzerland		deleted
Yonsei University, Seoul, Korea		deleted
Indian Institute of Science, Education and Research, India		deleted
University of Karlsruhe, Institute for Inorganic Chemistry, Supramolecular Chemistry Group, Germany		deleted
Fudan University, Department of Chemistry, New Energy and Materials Laboratory (NEML),		deleted

China		
Indian Institute of Technology Madras, National Centre for Catalysis Research (NCCR), India		deleted
University of Cologne, Institute of Inorganic Chemistry, Inorganic and Materials Chemistry, Germany		deleted
École Polytechnique Fédérale de Lausanne (EPFL), Institute of Microengineering, Switzerland		deleted
University of Rome Tor Vergata, Center for Nanoscience & Nanotechnology & Innovative Instrumentation (NAST), Italy		deleted
University of Heidelberg, Kirchhoff Institute of Physics, Germany		deleted
Loughborough University, UK		deleted
Lawrence Berkeley National Laboratory (LBNL), USA		deleted
University of Valenciennes, France		
Friedrich-Alexander University, Erlangen-Nürnberg, Germany		
Fudan University, Department of Materials Science, China		
EWHA Womans University Seoul, Department of Chemistry and Nanoscience, Korea		
Karlsruhe Institute of Technology, Germany		
Univesité de la Méditerranée, Marseille, France		
Anhui Key Laboratory of Nanomaterials and Nanostructures, China		
Multidisciplinary Center for Development of Ceramic Materials, Brazil		
Vietnam National University Ho Chi Minh City, Vietnam		
King Saud University, Saudi Arabia		
LMPG, Grenoble, France		
Université de Montréal (UdeM), Canada		
Flinders University, Australia		
University of Melbourne, Australia		
Shanghai Institute of Ceramics, China		
Tsinghua University, China		

Hanoi University of Science and Technology (HUST), Vietnam		
University of Sao Paolo, Brazil		
University College London (UCL), UK		
Kyungpook National University, Korea		
Centre Interdisciplinaire de Nanoscience de Marseille (CINaM-CNRS), France		
National Center for Nanoscience and Technology (NCNST), Beijing, China		
Huazhong University of Science and Technology (HUST), China		
Georgia Institute of Technology (GIT), Center for Nanostructure Characterization, USA		
CNRS, Centre d'élaboration de matériaux et d'études structurales (CEMES), France		
St. Petersburg State Electrotechnical University (LETI), Russia		
University of Bristol, Bristol Centre for Nanoscience and Quantum Information (NSQI), UK		
University of California Los Angeles (UCLA), The California NanoSystems Institute (CNSI), USA		
Donostia International Physics Center (DIPC), San Sebastian, Spain		newly added
Kyungpook National University, Korea		newly added
University of Eastern Finland, Finland		newly added
Indian Institute of Science (IISc), Bangalore, India		newly added
University of Toronto, Canada		newly added
Chongqing University of Science & Technology (CQUST) , China		newly added

2. Securing competitive research funding

- Competitive and other research funding secured in FY2014:

Total: 742 Million yen

- Describe external funding warranting special mention. Include the name and total amount of each grant.

Grants-in Aid for Scientific Research A
・N. Fukata: Controlling Carrier Transport through a Position-selective Doping in the Hetero-Core-Shell Nanowires [Budget:16,120,000Yen]

Grants-in Aid for Scientific Research B
・R. Yamamoto: Development of Methodology for Bio-safety Evaluation and Biodegradation Analysis of Bioadsorbable Mg Alloys [Budget:6,890,000Yen]
・T. Minari: Realization of Ultra-high Mobility Organic Transistor by Room-temperature Printing [Budget:6,370,000Yen]
・D. Golberg: Research on Nanoscale Photo-induced Power Generation and Opto-Electronic Engineering using Dynamics observation with High-resolution TEM [Budget:6,890,000Yen]

Grants-in Aid for Scientific Research for Young Scientists A
・Y. Ide: Photo-catalytic Selective Oxidation induced by High-quality SiO_2 mediated Highly-active TiO_2 [Budget:14,040,000Yen]
・Y. Yamauchi: Synthesis and Application of Nano-porous Metals Formed by Electrodeposition Method [Budget:12,220,000Yen]

Basic Research Programs (PRESTO)
・T. Nagata: Innovative Nano-electronics through Interdisciplinary Collaboration among Material, Device and System Layers / Development of fluoride based universal high-k dielectric thin film materials [Budget:11,440,000Yen]

3. International research conferences or symposiums held to bring world's leading researchers together

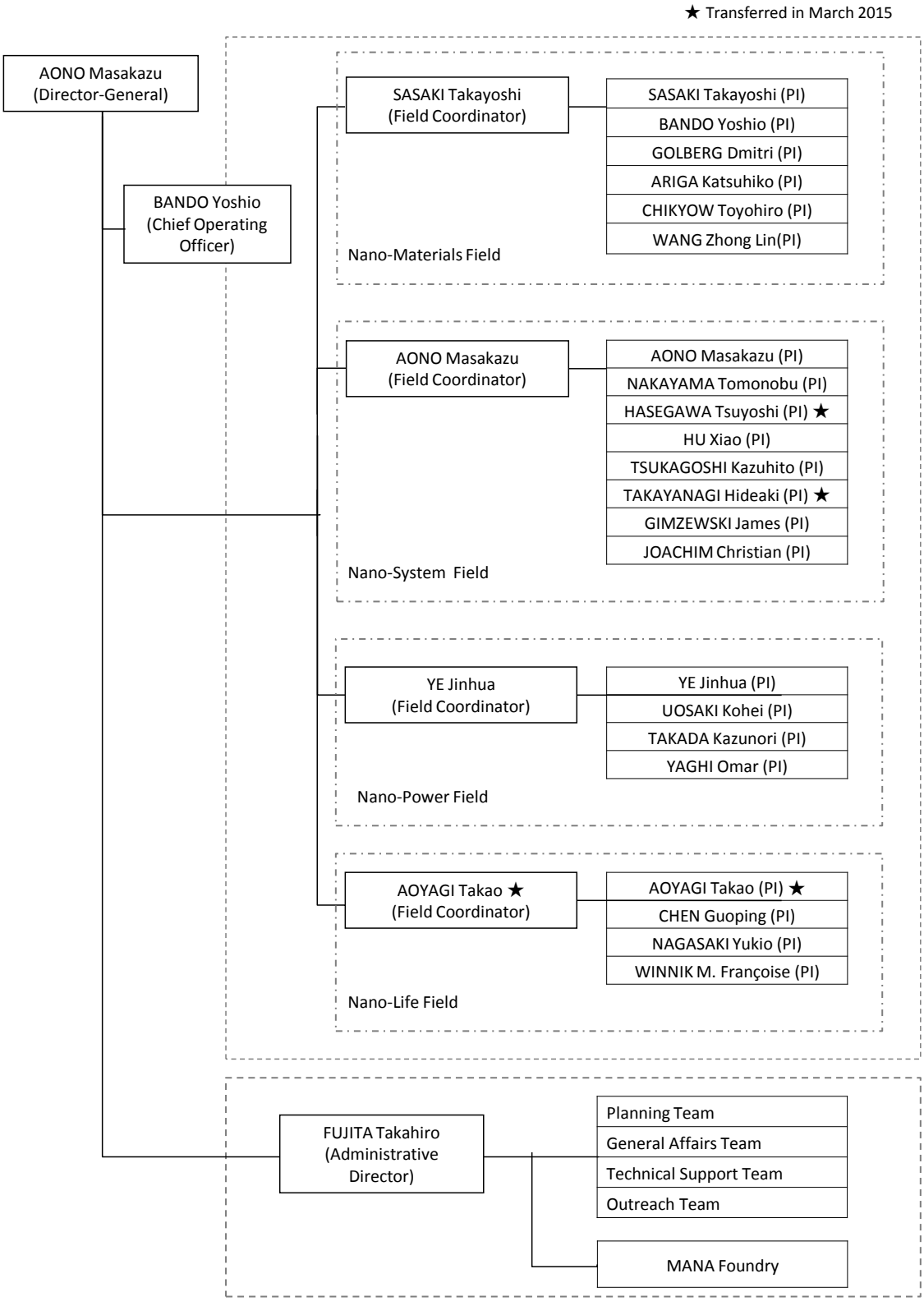
- Indicate the number of international research conferences or symposiums held in FY2014 and give up to three examples of the most representative ones using the table below.

FY 2014: 8 meetings

Major examples (meeting title and place held)	Number of participants
MANA International Symposium 2015 International Congress Center Tsukuba Epochal, Tsukuba	From domestic institutions: 369 From overseas institutions: 41
The 2nd International Symposium on Functionality of Organized Nanostructure 2014 Miraikan, Aomi, Tokyo	From domestic institutions: 197 From overseas institutions: 23
International Workshop on Topology in the New Frontiers of Materials Science WPI-MANA Auditorium, NIMS, Tsukuba	From domestic institutions: 155 From overseas institutions: 19

4. Center's management system

- Please diagram management system in an easily understood manner.
- If any changes have been made in the management system from that in the"Post-interim evaluation revised center project," please describe them. Please describe any changes made in the administrative director, head of host institution, and officer(s) in charge at the host institution (e.g., executive vice president for research)



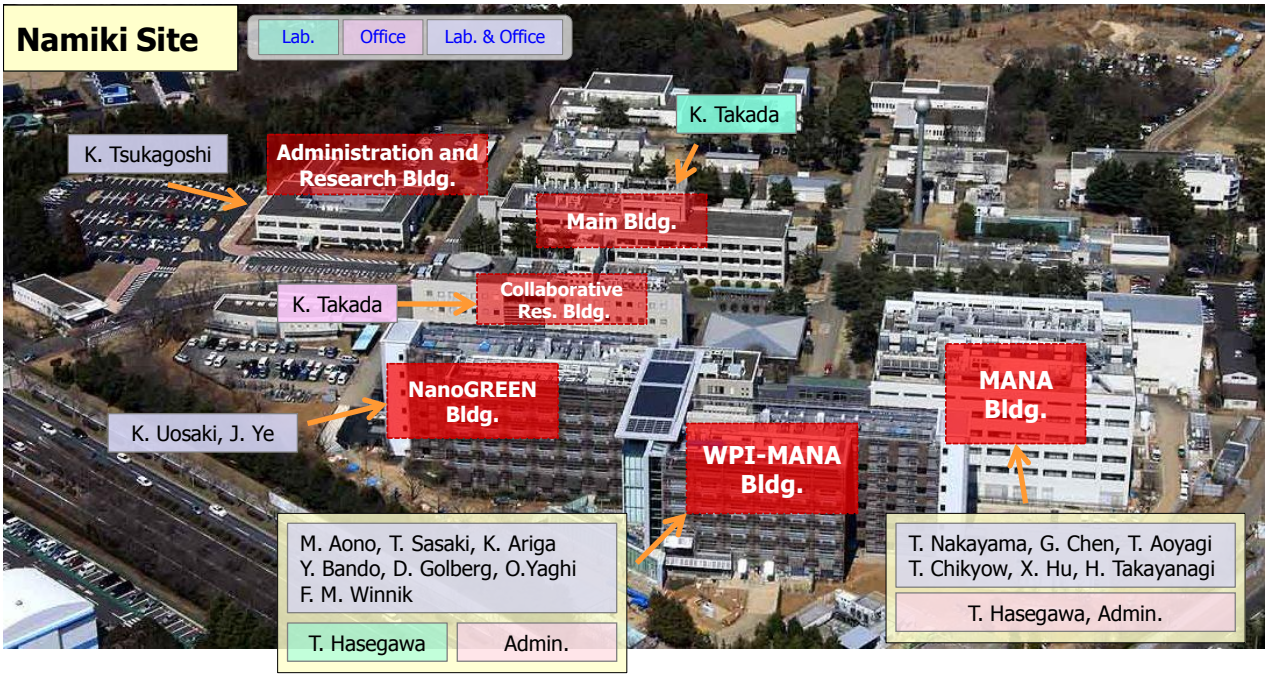
5. Campus Map

- Please draw a simple map of the campus showing where the main office and principle investigator(s) are located.

Campus Map

World Premier International Research Center (WPI) Initiative

WPI Center for Materials Nanoarchitectonics
National Institute for Materials Science



6. FY2014 Project Expenditures (the exchange rate used: 1USD=125JPY)

i) Overall project funding

Cost Items	Details	Costs (10,000 dollars)
Personnel	Center director and Administrative director	28
	Principal investigators (no. of persons): 14	138
	Other researchers (no. of persons): 190	932
	Research support staffs (no. of persons): 10	43
	Administrative staffs (no. of persons): 25	75
	Total	1216
Project activities	Gratuities and honoraria paid to invited principal investigators (no. of persons):47	14
	Cost of dispatching scientists (no. of persons):5	6
	Research startup cost (no. of persons):9	49
	Cost of satellite organizations (no. of satellite organizations):6	64
	Cost of international symposiums (no. of symposiums):8	10
	Rental fees for facilities	0
	Cost of consumables	27
	Cost of utilities	200
	Other costs	52
	Total	422
Travel	Domestic travel costs	1
	Overseas travel costs	3
	Travel and accommodations cost for invited scientists (no. of domestic scientists):26 (no. of overseas scientists):49	23
	Travel cost for scientists on secondment (no. of domestic scientists):4 (no. of overseas scientists):9	4
	Total	31
Equipment	Depreciation of buildings	327
	Depreciation of equipment	525
	Total	852
Other research projects	Projects supported by other government subsidies, etc.	638
	Commissioned research projects, etc.	338
	Grants-in-Aid for Scientific Research, etc.	201
	Total	1177
Total		3698

Ten thousand dollars

WPI grant	1048
Costs of establishing and maintaining facilities	0
Cost of equipment procured	292
Name of equipment: High resolution and high speed one dimensional X-ray detector and sample stage of thin film for Smart Lab. Number of units: 1 Costs paid:	2
Name of equipment: Particle analyzer Number of units: 1 Costs paid:	10
Name of equipment: Table cabinet for anti-exposure of nano material Number of units: 1 Costs paid:	1
Name of equipment: Energy dispersive X-ray spectrometer for MiniSEM Number of units: 1 Costs paid:	4
Name of equipment: Super computer lease fee Number of units: 1 Costs paid:	29
Others	246

ii) Costs of Satellites and Partner institutions

Cost Items	Details	Costs (10,000 dollars)
Personnel	Principal investigators (no. of persons):1	
	Other researchers (no. of persons):15	
	Research support staffs (no. of persons):5	
	Administrative staffs (no. of persons):2	
	Total	29
Project activities		3
Travel		2
Equipment		0
Other research projects		4
Total		38

Status of Collaboration with Overseas Satellites

1. Coauthored Papers

- List the refereed papers published in FY2014 that were coauthored between the center's researcher(s) in domestic institution(s) 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.
- For reference write the Appendix 1 item number in parentheses after the item number in the blocks below. Let it free, if the paper is published in between Jan.-Mar. 2015 and not described in Appendix 1.

Overseas Satellite 1: UCLA (USA) Total: 11 papers

No.	Author names and details
1-(A084)	A. Ghoneum, H.Q. Zhu, J. Woo, N. Zabinyakov, S. Sharma, *J.K. Gimzewski*, *Biophysical and morphological effects of nanodiamond/nanoplatinum solution (DPV576) on metastatic murine breast cancer cells in vitro*, Nanotechnology **25**(46), 465101 (2014). doi: 10.1088/0957-4484/25/46/465101
1-(A338)	S. Sharma, K. Das, J. Woo, *J.K. Gimzewski*, *Nanofilaments on glioblastoma exosomes revealed by peak force microscopy*, Journal of the Royal Society Interface **11**(92), 20131150 (2014). doi: 10.1098/rsif.2013.1150
1-(A339)	S. Sharma, E.E. Grintsevich, J. Woo, P.S. Gurel, H.N. Higgs, E. Reisler, J.K. Gimzewski, *Nanostructured Self-Assembly of Inverted Formin 2 (INF2) and F-Actin-INF2 Complexes Revealed by Atomic Force Microscopy*, Langmuir **30**(25), 7533 (2014). doi: 10.1021/la501748x
1-(A340)	S. Sharma, S. Lavender, J. Woo, L. Guo, W. Shi, L. Kilpatrick-Liverman, *J.K. Gimzewski*, *Nanoscale characterization of effect of L-arginine on Streptococcus mutans biofilm adhesion by atomic force microscopy*, Microbiology (United Kingdom) **160**(7), 1466 (2014). doi: 10.1099/mic.0.075267-0
1-(A341)	S. Sharma, C. Santiskulvong, J.Y. Rao, *J.K. Gimzewski,* O. Dorigo, *The role of Rho GTPase in cell stiffness and cisplatin resistance in ovarian cancer cells*, Integrative Biology **6**(6), 611 (2014). doi: 10.1039/c3ib40246k
1-(A360)	H.O. Sillin, E.J. Sandouk, A.V. Avizienis, M. Aono, *A.Z. Stieg*, *J.K. Gimzewski*, *Benchtop Fabrication of Memristive Atomic Switch Networks*, Journal of Nanoscience and Nanotechnology **14**(4), 2792 (2014). doi: 10.1166/jnn.2014.8636
1-(A370)	*A.Z. Stieg*, A.V. Avizienis, H.O. Sillin, C. Martin-Olmos, M.L. Lam, M. Aono, *J.K. Gimzewski*, *Self-organized atomic switch networks*, Japanese Journal of Applied Physics **53**(1), 01AA02 (2014). doi: 10.7567/JJAP.53.01AA02
1-(A390)	R. Tanoue, R. Higuchi, K. Ikebe, S. Uemura, N. Kimizuka, *A.Z. Stieg*, *J.K. Gimzewski*, M. Kunitake, *Positional selectivity of reversible azomethine condensation reactions at solid/liquid interfaces leading to supramolecule formation*, Journal of Electroanalytical Chemistry **716**, 145 (2014). doi: 10.1016/j.jelechem.2013.11.022
1-(A391)	R. Tanoue, R. Higuchi, K. Ikebe, S. Uemura, N. Kimizuka, *A.Z. Stieg*, *J.K. Gimzewski,* M. Kunitake, *Thermodynamic Self-Assembly of Two-Dimensional pi-Conjugated Metal-Porphyrin Covalent Organic Frameworks by "On-Site" Equilibrium Polymerization*, Journal of Nanoscience and Nanotechnology **14**(3), 2211 (2014). doi: 10.1166/jnn.2014.8540
	S.J. Jonas, *A.Z. Stieg*, W. Richardson, S. Guo, D.N. Powers, J. Wohlschlegel, B. Dunn, *Protein Adsorption Alters Hydrophobic Surfaces Used for Suspension Culture of Pluripotent Stem Cells*, Journal of Physical Chemistry Letters **6**(3), 388 (2015). doi: 10.1021/jz502520r

	D. Wickramaratne, P. Wilkinson, J.Y. Rao, N. Ragavendra, S. Sharma, *J.K. Gimzewski*, *Fine Needle Elastography (FNE) device for biomechanically determining local variations of tissue mechanical properties*, Journal of Biomechanics **48**(1), 81 (2015). doi: 10.1016/j.jbiomech.2014.10.038

Overseas Satellite 2 Georgia Institute of Technology (USA) Total: 8 papers

No.	Author names and details
2-(A047)	G. Cheng, Z.H. Lin, Z.L. Du, *Z.L. Wang*, *Increase Output Energy and Operation Frequency of a Triboelectric Nanogenerator by Two Grounded Electrodes Approach*, Advanced Functional Materials **24**(19), 2892 (2014). doi: 10.1002/adfm.201303659
2-(A151)	Y. Jing, X.Y. Bao, W. Wei, C. Li, K. Sun, D.P.R. Aplin, Y. Ding, *Z.L. Wang*, Y. Bando, D.L. Wang, *Catalyst-Free Heteroepitaxial MOCVD Growth of In As Nanowires on Si Substrates*, Journal of Physical Chemistry C **118**(3), 1696 (2014). doi: 10.1021/jp406428z
2-(A283)	S.M. Niu, Y.S. Zhou, S.H. Wang, Y. Liu, L. Lin, Y. Bando, *Z.L. Wang*, *Simulation method for optimizing the performance of an integrated triboelectric nanogenerator energy harvesting system*, Nano Energy **8**, 150 (2014). doi: 10.1016/j.nanoen.2014.05.018
2-(A310)	K.C. Pradel, W.Z. Wu, Y. Ding, *Z.L. Wang*, *Solution-Derived ZnO Homojunction Nanowire Films on Wearable Substrates for Energy Conversion and Self-Powered Gesture Recognition*, Nano Letters **14**(12), 6897 (2014). doi: 10.1021/nl5029182
2-(A312)	H.L. Qian, Y.G. Ma, Q. Yang, B.G. Chen, Y. Liu, X. Guo, S.S. Lin, J.L. Ruan, X. Liu, L.M. Tong, *Z.L. Wang, Electrical Tuning of Surface Plasmon Polariton Propagation in Graphene-Nanowire Hybrid Structure*, ACS Nano **8**(3), 2584 (2014). doi: 10.1021/nn406221s
2-(A371)	Y.J. Su, Y. Yang, X.D. Zhong, H.L. Zhang, Z.M. Wu, Y.D. Jiang, *Z.L. Wang*, Fully Enclosed Cylindrical Single-Electrode-Based Triboelectric Nanogenerator, ACS Applied Materials & Interfaces **6**(1), 553 (2014). doi: 10.1021/am404611h
2-(A436)	X.N. Wen, Y.J. Su, Y, Yang, H.L. Zhang, *Z.L. Wang*, *Applicability of triboelectric generator over a wide range of temperature*, Nano Energy **4**, 150 (2014). doi: 10.1016/j.nanoen.2014.01.001
2-(A437)	X.N. Wen, W.Q. Yang, Y. Ding, S.M. Niu, *Z.L. Wang*, *Piezoresistive effect in MoO_3 nanobelts and its application in strain-enhanced oxygen sensors*, Nano Research **7**(2), 180 (2014). doi: 10.1007/s12274-013-0385-8

Overseas Satellite 3 University of Montreal (Canada) Total: 11 papers

No.	Author names and details
3-(A008)	J.X. An, A. Dedinaite, *F.M. Winnik*, X.P. Qiu, P.M. Claesson, *Temperature-Dependent Adsorption and Adsorption Hysteresis of a Thermoresponsive Diblock Copolymer*, Langmuir **30**(15), 4333 (2014). doi: 10.1021/la500377w
3-(A181)	P. Kujawa, *F.M. Winnik*, *Materials nanoarchitectonics: a conspectus for polymer scientists*, Polymer International **63**(3), 377 (2014). doi: 10.1002/pi.4663

3-(A186)	Y.T.R. Lau, M. Yamaguchi, X. Li, Y. Bando, D. Golberg, *F.M. Winnik*, *Length Fractionation of Boron Nitride Nanotubes Using Creamed Oil-in-Water Emulsions*, Langmuir **30**(7), 1735 (2014). doi: 10.1021/la404961p
3-(A224)	D.W. Ma, N. Martin, C. Tribet, *F.M. Winnik*, *Quantitative characterization by asymmetrical flow field-flow fractionation of IgG thermal aggregation with and without polymer protective agents*, Analytical and Bioanalytical Chemistry **406**(29), 7539 (2014). doi: 10.1007/s00216-014-8200-2
3-(A232)	N. Martin, D.W. Ma, A. Herbert, D. Boquet, *F.M. Winnik*, C. Tribet, *Prevention of Thermally Induced Aggregation of IgG Antibodies by Noncovalent Interaction with Poly(acrylate) Derivatives*, Biomacromolecules **15**(8), 2952 (2014). doi: 10.1021/bm5005756
3-(A236)	S. Migita, A. Moquin, H. Fujisjiro, S. Himeno, D. Maysinger, *F.M. Winnik*, A. Taniguchi, *Quantum dots induce heat shock-related cytotoxicity at intracellular environment*, In Vitro Cellular & Developmental Biology-Animal **50**(4), 367 (2014). doi: 10.1007/s11626-013-9693-2
3-(A246)	N. Morimoto, Y. Sasaki, K. Mitsunushi, E. Korchagina, T. Wazawa, X.P. Qiu, S.I.M. Nomura, M. Suzuki, *F.M. Winnik*, *Temperature-responsive telechelic dipalmitoylglyceryl poly(N-isopropylacrylamide) vesicles: real-time morphology observation in aqueous suspension and in the presence of giant liposomes*, Chemical Communications **50**(61), 8350 (2014). doi: 10.1039/c4cc03199g
3-(A313)	X.P. Qiu, E.V. Korchagina, J. Rolland, *F.M. Winnik*, *Synthesis of a poly(N-isopropylacrylamide) charm bracelet decorated with a photomobile alpha-cyclodextrin charm*, Polymer Chemistry **5**(11), 3656 (2014). doi: 10.1039/c3py01776a
3-(A382)	R. Takahashi, X.P. Qiu, N. Xue, T. Sato, K. Terao, *F.M. Winnik*, *Self-Association of the Thermosensitive Block Copolymer Poly(2-isopropyl-2-oxazoline)-b-poly(N-isopropylacrylamide) in Water Methanol Mixtures*, Macromolecules **47**(19), 6900 (2014). doi: 10.1021/ma501538t
	T. Borke, *F.M. Winnik*, H. Tenhu, S. Hietala, *Optimized triazine-mediated amidation for efficient and controlled functionalization of hyaluronic acid*, Carbohydrate Polymers **116**, 42 (2015). doi: 10.1016/j.carbpol.2014.04.012
	A. Moquin, K.D. Neibert, D. Maysinger, *F.M. Winnik*, *Quantum dot agglomerates in biological media and their characterization by asymmetrical flow field-flow fractionation*, European Journal of Pharmaceutics and Biopharmaceutics **89**, 290 (2015). doi: 10.1016/j.ejpb.2014.12.019

Overseas Satellite 4 CNRS (France) Total: 7 papers

No.	Author names and details
4-(A067)	J. Echeverria, S. Monturet, *C. Joachim*, *One-way rotation of a molecule-rotor driven by a shot noise*, Nanoscale **6**(5), 2793 (2014). doi: 10.1039/c3nr05814j
4-(A092)	O. Guillermet, A. Mahmood, J.S. Yang, J. Echeverria, J. Jeannoutot, S. Gauthier, *C. Joachim*, F. Cherioux, F. Palmino, *Seeding Molecular Rotators on a Passivated Silicon Surface*, ChemPhysChem **15**(2), 271 (2014). doi: 10.1002/cphc.201301015
4-(A174)	M. Kolmer, S. Godlewski, R. Zuzak, M. Wojtaszek, C. Rauer, A. Thuaire, J.M. Hartmann, H. Moriceau, *C. Joachim*, M. Szymonski, *Atomic scale fabrication of dangling bond structures on hydrogen passivated Si(0 0 1) wafers processed and nanopackaged in a clean room environment*, Applied Surface Science **288**, 83 (2014). doi: 10.1016/j.apsusc.2013.09.124

4-(A270)	M. Nakaya, Y. Okawa, *C. Joachim*, M. Aono, T. Nakayama, *Nanojunction between Fullerene and One-Dimensional Conductive Polymer on Solid Surfaces*, ACS Nano **8**(12), 12259 (2014). doi: 10.1021/nn504275b
4-(A309)	M. Portais, *C. Joachim*, *Hole-electron quantum tunnelling interferences through a molecular junction*, Chemical Physics Letters **592**, 272 (2014). doi: 10.1016/j.cplett.2013.12.048
4-(A459)	J.S. Yang, J. Deng, C. Troadec, T. Ondarçuhu, *C. Joachim*, *Solid-state SiO_2 nano-gears AFM tip manipulation on HOPG*, Nanotechnology **25**(46), 465305 (2014). doi: 10.1088/0957-4484/25/46/465305
	T.L. Yap, H. Kawai, O.A. Neucheva, A.T.S. Wee, C. Troadec, M. Saeys, *C. Joachim*, *Si(100)-2 × 1-H dimer rows contrast inversion in low-temperature scanning tunneling microscope images*, Surface Science **632**, L13 (2015). doi: 10.1016/j.susc.2014.10.016

Overseas Satellite 5 University College London (UK) Total: 5 papers

No.	Author names and details
5-(A017)	M. Arita, *D.R. Bowler*, T. Miyazaki, *Stable and Efficient Linear Scaling First-Principles Molecular Dynamics for 10000+Atoms*, Journal of Chemical Theory and Computation **10**(12), 5419 (2014). doi: 10.1021/ct500847y
5-(A269)	A. Nakata, *D.R. Bowler*, T. Miyazaki, *Efficient Calculations with Multisite Local Orbitals in a Large-Scale DFT Code CONQUEST*, Journal of Chemical Theory and Computation **10**(11), 4813 (2014). doi: 10.1021/ct5004934
5-(A286)	C. O'Rourke, *D.R. Bowler*, *Intrinsic Oxygen Vacancy and Extrinsic Aluminum Dopant Interplay: A Route to the Restoration of Defective TiO_2*, Journal of Physical Chemistry C **118**(14), 7261 (2014). doi: 10.1021/jp407736f
5-(A287)	C. O'Rourke, *D.R. Bowler*, *DSSC anchoring groups: a surface dependent decision*, Journal of Physics: Condensed Matter **26**(19), 195302 (2014). doi: 10.1088/0953-8984/26/19/195302
5-(A362)	R. Smith, V. Brazdova, *D.R. Bowler*, *Hydrogen adsorption and diffusion around Si(001)/Si(110) corners in nanostructures*, Journal of Physics: Condensed Matter **26**(29), 295301 (2014). doi: 10.1088/0953-8984/26/29/295301

2. Status of Researcher Exchanges

- Using the below tables, indicate the number and length of researcher exchanges in FY2014. Enter by institution and length of exchange.
- Write the number of principal investigator visits in the top of each space and the number of other researchers in the bottom.

Overseas Satellite 1:UCLA（USA）

<To satellite>

	Under 1 week	From 1 week to 1 month	From 1 month to 3 months	3 months or longer	Total
FY2014	0 0	0 0	0 0	0 0	0 0

<From satellite>

	Under 1 week	From 1 week to 1 month	From 1 month to 3 months	3 months or longer	Total
FY2014	0 3	5 2	0 0	0 0	5 5

Overseas Satellite 2: Georgia Institute of Technology（USA）

<To satellite>

	Under 1 week	From 1 week to 1 month	From 1 month to 3 months	3 months or longer	Total
FY2014	0 0	0 2	0 0	0 0	0 2

<From satellite>

	Under 1 week	From 1 week to 1 month	From 1 month to 3 months	3 months or longer	Total
FY2014	2 0	0 0	0 0	0 0	2 0

Overseas Satellite 3: University of Montreal（Canada）

<To satellite>

	Under 1 week	From 1 week to 1 month	From 1 month to 3 months	3 months or longer	Total
FY2014	0 0	0 0	0 0	0 0	0 0

<From satellite>

	Under 1 week	From 1 week to 1 month	From 1 month to 3 months	3 months or longer	Total
FY2014	0 3	1 0	3 1	0 0	4 4

Overseas Satellite 4:CNRS（France）

<To satellite>

	Under 1 week	From 1 week to 1 month	From 1 month to 3 months	3 months or longer	Total
FY2014	0 1	0 0	0 0	0 0	0 1

<From satellite>

	Under 1 week	From 1 week to 1 month	From 1 month to 3 months	3 months or longer	Total
FY2014	1 3	3 0	0 0	0 0	4 3

Overseas Satellite 5: University College London（UK）

<To satellite>

	Under 1 week	From 1 week to 1 month	From 1 month to 3 months	3 months or longer	Total
FY2014	0 0	0 0	0 0	0 0	0 0

<From satellite>

	Under 1 week	From 1 week to 1 month	From 1 month to 3 months	3 months or longer	Total
FY2014	0 1	2 0	0 0	0 0	2 1

FY 2014 Visit Records of World Top-caliber Researchers from Abroad

Researchers Total: 42

Name (Age)	Affiliation (Position title, department, organization)	Academic degree, specialty	Record of research activities (Awards record, etc.)	Time, duration	Summary of activities during stay at center (e.g., participation as principal investigator; short-term stay for joint research; participation in symposium)
Jer-Liang Andrew Yeh (45)	ITRC Director General, National Applied Research Laboratories	Ph.D., Electrical Engineering	2014 ASME Fellow 2013 Distinguished Research Award of National Science Council 2012 Solar Industry Award, Germany	4/10	Inspection
Jun Nogami (55)	Professor, Chair of Mat. Science Dept., University of Toronto	Ph.D., Applied Physics	2010 Fellow, American Academy for the Advancement of Science (FAAAS),	4/21	Inspection
Christian Joachim (56)	Director of Research, Centre National de la Recherche Scientifique (CNRS)	Ph.D., Mathematical Physics, Quantum Physics	1997 & 2005 Feynman prize in Nanotechnology 1999 Nanotech. Prize, French Nanotech. Club. 1999 Fellow of the Inst of Physics (London) 1991 IBM France prize in Material Science	6/8-14,9/21-26, 11/16-29, 3/8-21	PI
Hartmut S. Leipner (56)	Professor, Martin-Luther-Universität Halle Technische Universität Clausthal, Germany	Ph.D., Physics		6/23-26	Workshop
Juergen Christen (55)	Professor, University Magdeburg	Ph.D., Physics	2009 Otto-von Guericke Gorschungs Award 1989 Carl Ramsauer Award AEG	6/23-26	Workshop
Martin Kittler (60)	Professor, Head of IHP/BTU Joint Lab Cottbus	Ph.D., Physics		6/23-26	Workshop
Giancarlo Salviati (64)	Research Director, IMEM-CNR Institute	Ph.D., Physics		6/23-26	Workshop
Donghwan Kim (54)	Professor, Korea University	Ph.D., Materials science and engineering		6/23-26	Workshop

James Gimzewski (62) FRS	Distinguished Prof., Director, UCLA CNSI Nano & Pico Charact. Core Facility. Scientific Director, UCLA Art|Sci Center	Ph.D., Physical chemistry	2002 Fellow, World Innovation Foundation 2001 Fellow Royal Acad. of Eng., UK 2001 Dudell Medal and Prize 2000 IBM Sixth Inv. Achiev. Plateau Award 1998 The 'Wired 25' Award, 1997 Feynman Prize in Nanotechnolog 1997 IBM Outstanding Innovation Award	6/29-7/5, 8/3-9, 9/21-27, 11/24-29, 3/5-14	PI
Francoise Winnik (62)	Professor, Pharmacy & Dept. of Chemistry, University of Montreal	Ph.D., Bio chemistry	2008-present Executive editor, Langmuir 2009 Doolittle award, PMSE division of the ACS 2006 Clara Benson Award (Canadian Institute of Chemistry)	7/13-8/8, 9/15-10/11, 12/14-1/23. 3/1-3/31	PI
Zhong Lin Wang (53)	High Tower Chair of Mat. Sci. & Eng. Georgia Inst. of Technology	Ph.D., Nanoscience and nanotechnology	2014 China International Science and Technology Collaboration Award The James C. McGroddy Prize in New Materials from American Physical Society, 2013 ACS Nano Lectureship 2012 Edward Orton Memorial Lecture Award, American Ceramic Society CAREER award	9/24-27, 3/11-13	PI
Francoise Brochard Wyart (70)	Professor, Institut Curie, France	Ph.D., Dynamics of Liquid Crystals	2007 Prix Roberval 1998 Prix Jean Ricard	11/11-29	Collaboration research
Richard Berndt (54)	Director of IEAP, Professor, Kiel University	Ph.D., Physics		11/11-17	Seminar
Michele Parrinello (69)	Professor, ETH Zurich	Ph.D., Computational Science	2011 Marcel Benoist Prize, 2009 Dirac award and the Sydney fernbach award, 2004 Fellow of the Royal Society	11/14	Workshop
Michael L. Klein (74)	Dean, College of Science and Technology Laura H. Carnell	Ph.D., Theory, Simulation, Modeling	2014 Indian Academy of Science 2013 Fellow, Royal Society of Chemistry	11/14	Workshop

FRS	Professor of Science, Temple University		2009 United States National Academy of Sciences 2008 Peter Debye Award 2003 Fellow, Royal Society of London		
Ann Andrews (52)	Shirley M. Hatos Endowed Chair in Clinical Neuropharmacology, Professor of Psychiatry & Biobehavioral Sciences and Chemistry & Biochemistry, UCLA	Ph.D., Chemistry	NIH Fellows Award for Research Excellence, an Eli Lily Outstanding Young Analytical Chemist Award, an American Parkinson's Disease Association Research Award, Behavior Research Foundation Independent Investigator Award	11/26-28	Symposium
Donald Eigler (62)	CEO, The Wetnose Institute for Advanced Pelagic Studies	Ph.D., Physics	2010 Kavli Prize in Nanoscience	11/26-28	Symposium
Christoph Gerber (72)	Director of Scientific Communication, NCCR Nanoscale Science Department of Physics, University of Basel	Ph.D., Nanoscale Science, Scanning Prove Microscopy, STM, AFM, Biochemical Sensors	The Invention of Scanning Tunneling Microscope (STM) and Atomic Force Microscope (AFM),	11/26-28	Symposium
Francois Grey (51)	Professor, Tsinghua University, Head of IT Communication, CERN	Ph.D., Physics,		11/26-28	Symposium
Guy LeLay (69)	Professor, Aix-Marseille University	Ph.D., Condensed Matter Physics, Materials Physics, Materials Science	2007 Classe exceptionnelle 2	11/26-28	Symposium
Mervin Miles (66) FRS	Director, Centre for Nanoscience & Quantum Information at University of Bristol	Ph.D., AFM	2011 Fellow of the Royal Society 2005 Royal Society Wolfson Research Merit Award	11/26-28	Symposium

Paul Weiss (55)	Distinguished Professor of Chemistry & Biochemistry Distinguished Professor of Materials Science & Engineering, California NanoSystem Institute, UCLA	Ph.D., Chemistry	2015 ACS Award in Colloid and Surface Chemistry, 2013 Fellow, American Academy of Arts and Sciences 2010 Fellow, American Chemical Society	11/26-28	Symposium
Stan Williams (63)	Senior fellow and the founding director of the Quantum Science Research Laboratory at Hewlett-Packard	Ph.D., Physical chemistry	2007 Glenn T. Seaborg Medal, UCLA 2004 Helman Bloch Medal for Industrial Research 2000 Foresight Institute Feynman Prize in Nanotechnology	11/26-28	Symposium
Mark Welland (59)	Professor, University of Cambridge	Ph.D., Physics	2011 Knighted on Queen's Birthday Honours 2002 Fellowships of the RS and RAEng.	11/26-28	Symposium
Javad Mostaghimi (62)	Professor, Mechanical Engineering, University of Toronto	Ph.D., Mechanical Engineering	2013 Robert W. Angus Medal of the CSME 2012 Heart Transfer Memorial Award of the ASME 2011 Jules Stachiewicz Medal of the CSME 2010 NSERC Brockhouse Canada Prize	12/4-5	Symposium
Tony David James (50)	Professor, University of Bath	Ph.D., Structure-Activity Studies of Ion Channel Mimics	2013 Daiwa-Adrian Prize 1995-2003 Royal Society Research Fellow	1/5-2/7	Collaboration research
Hongwei Zhu (41)	Professor, Tsinghua University	Ph.D., Materials Processing Engineering	2008 New Century Excellent Talents in University 2006 2nd –Class National Natural Science Award	1/18-2/28	Collaboration research
Peter Atanasov (72)	Head of Gas lasers and laser technologies laboratory Institute of Electronics, Bulgarian Academy of Science	Ph.D., Physics, Devices	2009 "Pythagoras 2009" Award 2008 "Academician Emil Djakov" Award 2006"Academician Emil Djakov" Award	1/19-1/28	Collaboration research

Valerii Vinokur (62)	Director of Materials Theory Institute and Senior Scientist at Materials Science Div., Argonne National Laboratory	Ph.D., Mesoscopic Physics	2003 Alexander von Humboldt Research Award 2003 John Bardeen Prize for Theory of Superconductivity for the worked on the Theory of Vortex Matter	1/21-1/31	Seminar
Stefan Haacke (47)	Director of IPCMS, University of Strasburg	Ph.D., Ultrafast Processes, Biomolecules & Organic Nanomaterials	2006-Present Bonus "Prime d'Excellence Scientifique" 1999 ABB Prize in Solid State Physics, Swiss Physical Society	1/26-27	Workshop
Carlo Massobrio (58)	Deputy Director IPCMS, University of Strasbourg	Ph.D., Atomic-scale Simulation of Materials		1/26-27	Workshop
Franck Gascoin (38)	Associate Professor, University of Caen, CRISMAT Laboratory, CNRS	Ph.D., Solid State Chemistry	2003-2005 3 NASA TechBrief Awards, 2000-2002 Reilly Fellowship, University of Notre Dame	2/15-18	Collaboration research
Yanwu Zhu (34)	Professor, University of Science and Technology of China	Ph.D., Physics	2013 NSFC Excellent Young Scientist, 2011 Scopus Young Researcher Award	2/22-27	Collaboration research
Licheng Sun (52)	Professor, KTH Royal Institute of Technology	Ph.D., Solar Cells, Solar Fuels	RSC Advances Advisory Board 2014 Thomson Reuters Highly Cited Researcher, The World's Most Influential Scientific Mind	3/11-13	Symposium
Thomas Lippert (52)	Head of the Materials Group, Dept. of General Energy Research, Paul Scherrer Institute (PSI), Professor Dept. of Chemistry and Applied Biosciences, ETH Zurich.	Ph.D., Physical Chemistry	2014-present President E-MRS 2012-2013 Vice President E-MRS	3/11-13	Symposium
Vincent Rottello (50)	Distinguished Professor, University of Massachusetts	Ph.D., Organic Chemistry Biomedical and Materials Applications of Nanosystems	2013 University of Massachusetts System Technology Development Award, 2012 Spotlight Scholar, University of Massachusetts	3/11-13	Symposium

			2010 Fellow, American Association for the Advancement of Science 2007 Fellow, Royal Society of Chemistry		
Kam Leong (60)	Duke University	Ph.D., Chemical Engineering	2013 Elected into National Academy of Engineering 2012 Society for Biomaterials Clemson Award for Applied research 2010 Stansell Family Distinguished Research Award	3/11-13	Symposium
Winfried Teizer (44)	AIMR Jr. PI, Tohoku Univ. PI, Texas A&M Univ.	Ph.D., Molecular Nanomagnets, Spintronics, Nanophysics and Highly Correlated Systems	2004 Montague/Center for Teaching Excellence Scholar, Texas A&M University	3/11-13	Symposium
Anthony Cheetam (69) FRS	Goldsmiths' Professor of Materials Science, University of Cambridge	Ph.D., Functional Inorganic and Hybrid Materials	2011-present Vice President, Royal Society 1994 Fellow of the Royal Society 1988 Solid State Chemistry Award of RS 1982 Corday-Morgan Medal & Prize of RSC	3/11-13	Chair of MANA Evaluation Committee
Yoshio Nishi (75)	Professor, Stanford University	Ph.D., Nanoscale Devices	2012 Fellow International Japan Society of Applied Physics 2008 Lifetime Achievement Award 2002 IEEE Robert Noyce Medal 1995 IEEE Jack Morton Award	3/11-13	MANA Evaluation Committee Member
Horst Hahn (62)	Executive Director/Research Unit Chair, Inst. of Nanotechnology, KIT	Ph.D., Nanostructured Materials, Nanoporous Materials Nanoglasses, Energy Materials, Batteries	2013 Robert Franklin Mehl Award	3/11-13	MANA Evaluation Committee Member
Michiel Sprik (61)	Professor, University of Cambridge	Ph.D., Computational physical chemistry, Interfacial electrochemistry		3/30-31	Collaboration research

State of Outreach Activities

- Using the table below, show the achievements of the Center's outreach activities in FY2014 (number of activities, times held).
- Describe those activities that have yielded novel results or that warrant special mention in the "Special Achievements" space below.
- In appendix 7, list and describe media coverage (e.g., articles published, programs aired) in FY2014 resulting from press releases and reporting.

Activities	FY2014(number of activities, times held)
PR brochure, pamphlet	5
Lectures, seminars for general public	7
Teaching, experiments, training for elementary and secondary school students	30
Science cafe	0
Open houses	2
Participating, exhibiting in events	5
Press releases	13
Research Highlights (e-mail newsletter)	8

Special Achievements

At the 2014 spring meeting of the European Materials Research Society (E-MRS) in Lille, France, MANA organized and supervised showcase-presentation of research outcomes from four WPI centers, MANA, AIMR, iCeMS and I^2CNER. This activity was successful and the president of E-MRS agreed to organize a WPI session in the next E-MRS meeting in 2016.

Twenty excellent research outcomes of MANA in 2007-2014 were selected and highlighted by publishing a book, "Research at MANA". More than 500 books have been distributed through our outreach activity.

FY 2014 List of Project's Media Coverage

- Select main items of coverage, and list them within these 2 pages.

No.	Date	Type media (e.g., newspaper, television)	Description
1	Apr. 8, 2014 Apr. 18, 2014 Apr. 21, 2014	Nikkan Sangyo Shimbun Nihon Keizai Shimbun (Nikkei) Sankei Shimbun	The "Smart Polymer Rangers" appeared at the NIMS Open House and presented an easy-to-understand explanation of smart polymer biomaterials to general citizens.
2	Apr. 11, 2014	The Science News	NAD(P)H, a coenzyme which is widely related to biological activity and disease, was visualized for the first time in the world. (Hirokazu Komatsu and Katsuhiko Ariga)
3	May 12, 2014 May 13, 2014 May 20, 2014 May 30, 2014	Nikkan Kogyo Shimbun / Nikkei Sangyo Shimbun, The Chemical Daily, Nikkan Sangyo Shimbun, The Science News	A technology for forming organic thin-film transistors by printing at room temperature without heating was developed. (Takeo Minari)
4	May 21, 2014 May 26, 2014	Japan Metal Daily Nikkan Sangyo Shimbun	The possibility of boron nitride thin film as an oxygen reduction catalyst was demonstrated theoretically and experimentally. (Kohei Uosaki)
5	June 6, 2014 June 10, 2014 June 13, 2014	Nikkan Kogyo Shimbun Nikkan Sangyo Shimbun Japan Metal Daily	Oxide thin-film crystals of a quality comparable to single crystals were successfully grown on a glass plate. (Takayoshi Sasaki)
6	June 17, 2014 June 18, 2014 June 20, 2014 July 11, 2014	The Chemical Daily / Ibaraki Shimbun / NHK TV / Nihon Keizai Shimbun (Nikkei) / Yomiuri Shimbun, Mainichi Shimbun / Nikkan Kogyo Shimbun / Tokyo Shimbun, Joyo Shimbun / Sankei Shimbun, The Science News	The cesium distribution in cells of plants which have absorbed cesium was successfully visualized for the first time in the world. (Hirokazu Komatsu and Katsuhiko Ariga)
7	June 19, 2014 June 20, 2014 June 24, 2014	NIkkan Kogyo Shimbun Nikkan Sangyo Shimbun Nikkan Sangyo Shimbun	An unprecedented high efficiency development technique was created for "friction material" with coefficient of friction of an aimed value, which has attracted attention in connection with energy problems, etc. (Masahiro Goto)
8	June 24, 2014	Nikkan Kogyo Shimbun	A technology was developed for free creation of self-assembled structures, including multilayer films and structures of fibers, micelles, etc., by tail-attached fullerenes. (Takashi Nakanishi)
9	July 11, 2014	The Chemical Daily	A high accuracy simulation of the cathode-solid electrolyte interface of an all solid-state lithium ion secondary battery was performed successfully for the first time in the world. (Yoshitaka Tateyama)
10	Sep. 9, 2014 Sep. 19, 2014	The Chemical Daily Nikkan Kogyo Shimbun	A technology for high speed forming of interconnects with high adhesion to plastics was developed. (Toyohiro Chikyow, Jin Kawakita)
11	Sep. 11, 2014	The Chemical Daily	A non-polar GaN epitaxial film was successfully fabricated on a general-purpose silicon surface, and ultraviolet light emission was realized on this substrate. (Toyohiro Chikyo)

12	Oct. 24, 2015	Radio Tsukuba	A talk by MANA Principal Investigator Katsuhiko Ariga was broadcasted, in which Dr. Ariga explained "Nanoarchitectonics".
13	Nov. 13, 2014	Ibaraki Shimbun	MANA Scientist Mitsuhiro Ebara, was featured as a researcher who contributes science outreach activities with "Smart Polymer Rangers".
14	Nov. 26, 2014	Nikkei Sangyo Shimbun	MANA was featured as a research center which is challenging the world's most advanced materials development by utilizing nanotechnology, and MANA's contributions to cancer treatment and research on the brain were introduced.
15	Nov. 28, 2014 Dec. 5, 2015	The Chemical Daily Nikkan Sangyo Shimbun	The surface electronic state of a strontium titanate substrate was successfully elucidated by combined use of observation with an ultra-high resolution microscope and first-principle calculations. (Ikutaro Hamada)
16	Dec. 9, 2015	Nikkan Kogyo Shimbun	A technique which greatly increases the scale of first-principle calculations simulating the behaviors of atoms and electrons was developed. (David Bowler)
17	Dec. 11, 2014 Jan. 16, 2015	Nikkan Kogyo Shimbun The Science News	An atomic step (difference in level with a height of 1 atom) was discovered in an atomic level thickness superconductor formed on a silicon surface; this research also revealed that the atomic steps which form in the superconductor act as Josephson junctions. (Takashi Uchihashi, etc.)
18	Jan. 7, 2015 Jan. 14, 2015 Jan. 16, 2015	Nikkan Kogyo Shimbun The Chemical Daily Joyo Shimbun	A hydrogel material with unique properties was developed by utilizing the electrostatic repulsion between nanosheets. The material can withstand large vertical loads but is easily deformed in the horizontal direction. (Takayoshi Sasaki)
19	Feb. 2015	Nikkei Science	A talk by MANA Principal Investigator Katsuhiko Ariga was published, in which Dr. Ariga explained his research on supramolecules to general citizens in easy-to-understand language.
20	Feb. 3, 2015	Nikkei Sangyo Shimbun	The Director-General of MANA, Dr. Masakazu Aono, was featured as a "Japanese innovator," and his career and the results of his research on atomic switches, etc. were introduced.
21	Feb. 26, 2015	Asahi Shimbun	The discontinuation of subsidies to 4 WPI Centers was reported, and comments, etc. by MANA's Director-General, Dr. Masakazu Aono, were presented.
22	Mar. 11, 2015	The Chemical Daily	Mesoporous particles consisting of only phospholipids were developed; application to drug delivery systems and raw materials for cosmetics is expected. (Kosaku Kawakami)
23	Mar. 17, 2015	Nikkan Sangyo Shimbun	Prof. Emeritus Toshio Suzuki of the University of Tokyo presented a Special Lecture at the NIMS Research Center for Structural Materials Symposium, in which he mentioned that "the human resources development system should be enhanced by taking MANA as a model," etc.
24	Mar. 24, 2015	Nikkan Sangyo Shimbun	A gold nanoporous material having uniform, regular nanospaces was successfully developed. (Yusuke Yamauchi)