MANA Progress Report 2008

World Premier International (WPI) Research Center
International Center for
Materials Nanoarchitectonics (MANA)

National Institute for Materials Science (NIMS)

Preface

Masakazu Aono
MANA Director-General

The International Center for Materials Nanoarchitectonics (MANA) was one of five institutions selected for the Ministry of Education, Culture, Sports, Science and Technology (MEXT)-sponsored World Premier International (WPI) Research Center Initiative. It was launched in October 2007 under the direction of the National Institute for Materials Science (NIMS). The project concept for MANA aims to build a highly visible, world-class materials nanotechnology research center that attracts top researchers from around the world and that the world's best researchers want to visit and be a part of. To achieve this, MANA promotes challenging, cutting-edge fundamental nanotechnology research by utilizing the skills of its multinational, independent researchers. It contributes to the creation of innovation and the development of science and technology through the invention and discovery of new materials and devices. MANA research is grouped into the four research fields: Nano-Materials, Nano-System, Nano-Green and Nano-Bio. MANA has fortified its global network by establishing Satellites throughout Japan and the world, and it endeavors to hold international symposia and conduct public relations to disseminate information externally. MANA actively strives for continuous improvement in an integrated effort that includes evaluation reports from external experts.

The MANA Progress Report 2008 serves as a summary to highlight the progress that MANA projects have made since the Inauguration of MANA in October 2007. For our readers' convenience, an overview of research activities has been summarized in the separate booklet MANA Research Digest 2008.

We look forward to your continued understanding and support of MANA activities.

MANA Progress Report 2008

8. Appendix

1. MANA Overview

As shown in Table 1-1, MANA was one of five institutions selected for the Ministry of Education, Culture, Sports, Science and Technology (MEXT)-sponsored World Premier International (WPI) Research Center Initiative in FY2007. The WPI Program aims to build highly visible, world-class research centers that attract top researchers from around the world, and the selected centers will receive priority in financial support over the next 10 to 15 years.

Table 1-1: The five WPI Research Centers.

Host Institution	WPI Research Center	Research Field
Tohoku University	Advanced Institute for Materials Research (AIMR)	Materials Science
University of Tokyo	Institute for the Physics and Mathematics of the Universe (IPMU)	Astrophysics
Kyoto University	Institute for Integrated Cell-Material Sciences (iCeMS)	Meso-Control Stem Cells
Osaka University	Immunology Frontier Research Center (IFReC)	Immunology
National Institute for Materials Science	**International Center for Materials Nanoarchitectonics (MANA)**	**Nanotechnology, Materials**

1.1 Objectives and Mission

The MANA concept aims to develop MANA into a world-class nanotechnology and nanomaterials research center within 10 years, while steadily developing NIMS into the world's top materials research center. To achieve this objective, MANA aims the creation of fundamental research center leading to nano-innovations based on pioneering scientific and technical convergence. The missions of MANA are:

1. Development of challenging research by materials nanoarchitectonics
2. Creation of a "Melting Pot", where top-level researchers gather from around the world
3. Fostering and securing young scientists, who are rich in originality
4. Construction of a network, which links the world's top-notch nano centers.

1.2 Research Targets

MANA's basic concept of materials nanoarchitectonics is a new nanotechnology and materials research concept that uses systematic techniques to draw out the extreme functions of materials through a deep understanding of the mutual interaction of individual nanostructures and by arranging them in intentional configurations. MANA strives for a convergence of the following 5 research techniques: 1) Controlled Self-Organization, 2) Atom/Molecule Novel Manipulation, 3) Chemical Nanomanipulation, 4) Theoretical Modeling & Designing and 5) Field-induced Material Control. Utilizing these techniques, research will focus on 4 fields, i.e., the two fields of Nano-Materials and Nano-Systems—fields in which NIMS has taken a global lead and has an excellent track record—and the two innovation-oriented fields of Nano-Green and Nano-Bio. MANA aims to develop new materials to contribute to sustainable development.

Detailed research objectives for each field are as follows:

1) **Nano-Materials Field:** to utilize new synthetic methods to explore novel nanoscale materials, such as nanotubes, nanowires, nanosheets, nanoparticles and supramolecules in organic/inorganic/metal systems and to artificially assemble these materials to produce new innovative functions.
2) **Nano-System Field:** to create novel functionality as a system through systematic organization of nanostructures by various novel methods for fabrication/organization, property measurement, and theoretical modeling.
3) **Nano-Green Field:** to develop highly-efficient energy conversion systems for solar energy, fuels and biomass, which are essential for sustainable society, by controlled arrangement of atom and molecules based on rational design, i.e., nanoarchitectonics.
4) **Nano-Bio Field:** to develop innovative biocompatible materials and functional biodevices for regenerative medicine, cell therapy, minimum-invasive surgery and clinical diagnostics by integrating materials science and biological science.

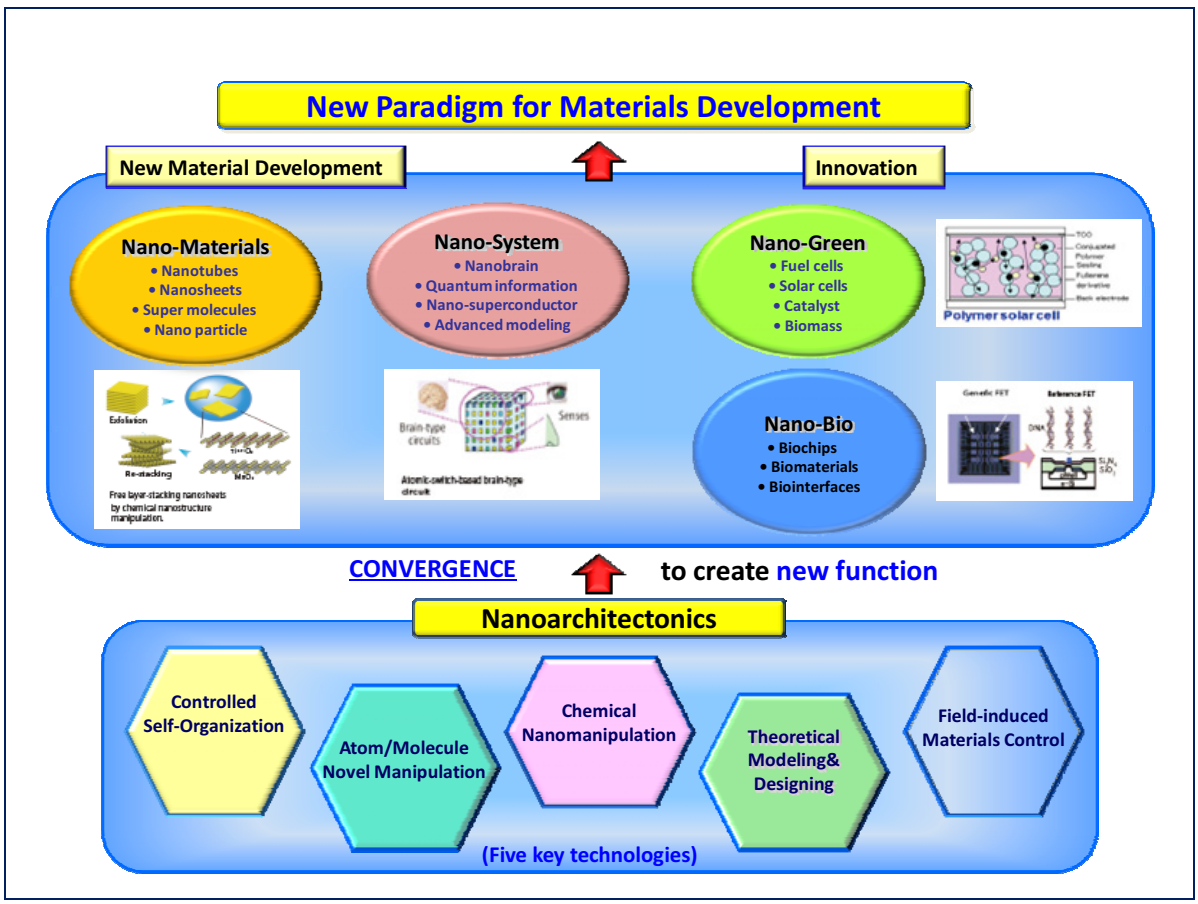


Fig. 1-1: Research Targets of MANA.

1.3 Creating an Attractive International Research Environment

Creating an attractive international research environment is essential for achieving the mission of MANA. NIMS utilizes the know-how gained from running the ICYS Project (2003-2008) to promote a melting pot environment, foster young researchers, provide full support in English, allow the free use of NIMS facilities and support innovation in encouraging creation of an attractive international research environment.

● Promoting a Melting Pot Environment

A melting pot environment that exhibits the 4 “Ins”, International, Interdisciplinary, Interdependent and Innovative, is essential for the creation of a top-level research center. Utilizing the know-how and traditions accumulated from running the ICYS Project, MANA will further develop the melting pot environment that inspires and integrates the research ideas of multidisciplinary, multicultural and multinational of researchers gathered together in one center. From this standpoint, MANA aims to maintain the ratio of foreign researchers at 50% or higher.

● Cultivating Young Researchers

MANA uses its 3D System to promote field-integrated research for its young researchers. The 3D system consists of Double-Affiliation (i.e., affiliation to MANA and one of the satellites or partner institutions), Double-Discipline (i.e., 2 specializations), and Double-Mentoring from 2 research supervisors. Young researchers are actively engaged in integrated research topics. They receive advice from their 2 mentors (outstanding Principal Investigators or visiting advisors) and conduct joint work with partner institutions. MANA also makes every effort to improve the quality of its young scientists by actively developing international ties, i.e. sending researchers to work in foreign partner institutions and convening international workshops and symposia, in order that they can become top-level researchers.

● **Full Support in English**

In order to eliminate the barriers of language and nationality, English has been designated as the official language of MANA. MANA strives to internationalize across the board and to succeed in providing fully bilingual support. To achieve this, MANA hires technicians and staff proficient in English to assist its foreign researchers while promoting the following support systems:

- Implementation of researcher orientations in English
- Support in English from proficient staff and technicians
- Provision of information in English via the web and the intranet
- Provision of English documentation for administrative procedures
- Provision of information in English concerning external funding
- Distribution of English guidebooks concerning research and daily life
- Offering of Japanese culture classes

● **Support in Using NIMS Facilities**

A research environment in which researchers can utilize most of NIMS' excellent facilities, including its world-class, mid and large-scale equipment is an important merit for researchers. By providing MANA researchers access to facilities and equipment in this manner, MANA has established a system to promote advanced research.

● **Innovation Support**

It is important for MANA to proactively encourage innovation and technology transfer by obtaining patents. To achieve this, NIMS staff assists researchers in applying for patents and promote the contribution of research output to the community by working with industry to operate NIMS Evening Seminars.

2. MANA Organization, Management, and Researcher Retention

In order to realize the MANA concept, it is extremely important to establish efficient organizational operation and to retain outstanding researchers to participate in MANA activities.

2.1 Organization

An overview of the MANA organization is shown in Figure 2-1. The role of MANA members can be found in Table 2-1. The MANA Workforce (number of personnel, foreigners and women) is shown in Table 2-2.

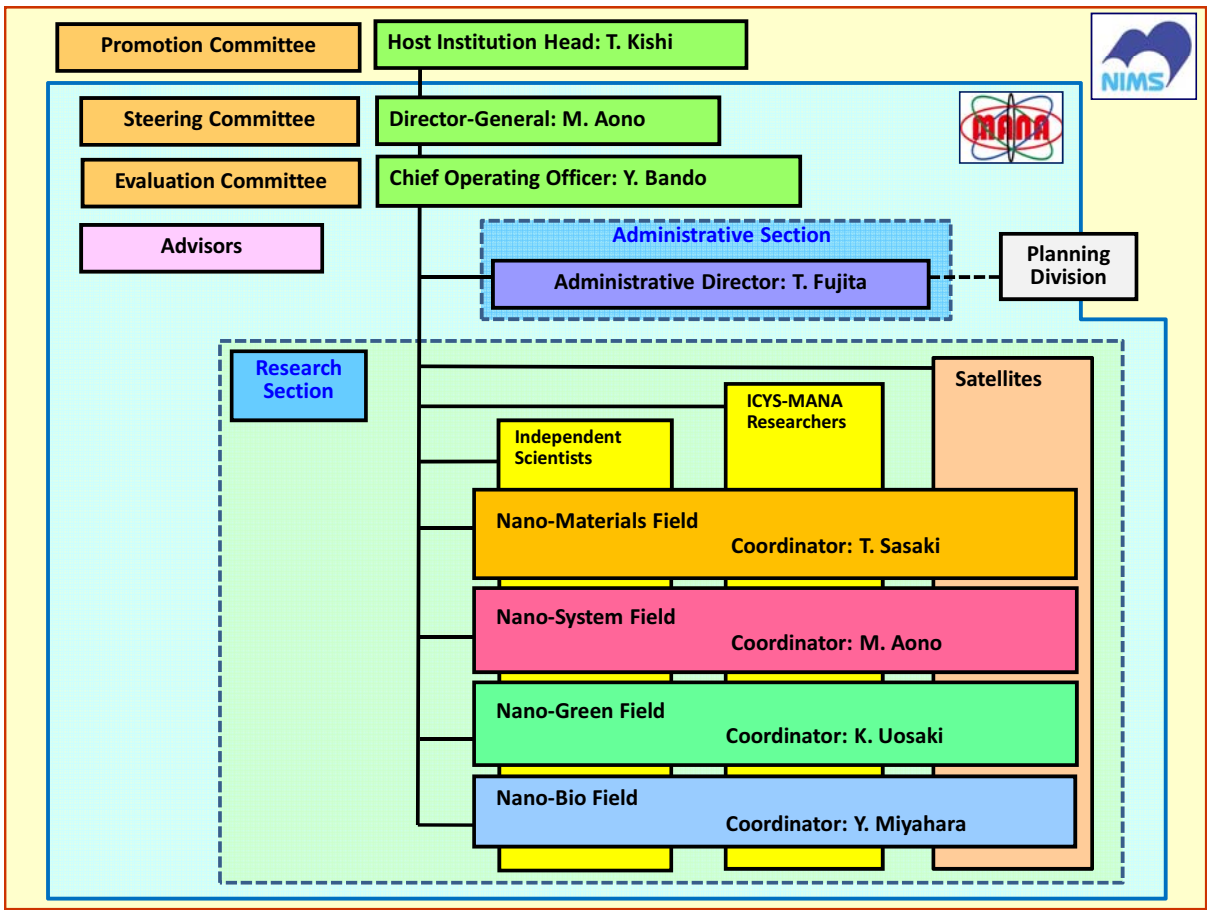


Fig. 2-1: Organization Chart of MANA.

Table 2-1: MANA Members and Duties.

Director-General:	Center oversight
Chief Operating Officer:	Assists the Director-General and supervises research
Administrative Director:	Takes orders from the Director-General and supervises clerical and administrative duties
Principal Investigators (PI):	Researchers responsible for MANA research fields
MANA Scientists:	Permanent researchers that conduct research under the supervision of the PIs
MANA Independent Scientists:	Young permanent researchers that conduct research independent from the PIs
ICYS-MANA Researchers:	Postdoctoral researchers that conduct research independent from the PIs
MANA Research Associates:	Postdoctoral researchers that conduct research under the supervision of the PIs and MANA Independent Scientists
Graduate Students:	Graduate student researchers that conduct researcher in partner graduate school programs
Research Support Staff:	Technicians that support research work
Administrative Staff:	Staff that supports administrative duties

Table 2-2: MANA Workforce.

as of March 31, 2009

Personnel at MANA	Personnel	Foreigners	Women
Principal Investigators	30	10	1
Researchers *	130	73	14
Technical Staff	13	1	5
Administrative Staff	19	2	12
Total	192	86	32

*: Researchers include MANA Scientists, MANA Independent Scientists, ICYS-MANA Researchers, MANA Research Associates and Graduate Students.

MANA decision-making was strengthened in October 2008 with the appointment of a Chief Operating Officer (COO) in addition to the Director-General and the Administrative Director. This appointment aimed to reduce the burden on the Director-General who is also a Principal Investigator and to bolster and accelerate Center operations. The MANA policy concerning the research organization centered on the PIs was further clarified in October 2008 with the establishment of the 4 research fields, Nano-Materials, Nano-System, Nano-Bio and Nano-Green, and the assignment of coordinators for each field. This was implemented after deliberations of the feedback received from the WPI Follow-Up Committee. In addition, young postdoctoral ICYS-MANA Researchers joined the MANA team in April 2008 to carry on the young postdoctoral researcher system established under the ICYS Project that concluded in March 2007.

In October 2008, the administrative section was divided into 3 teams, Planning, Administration and Technical Support, in order to further clarify the administrative system. The English language support system was bolstered with the appointment of 2 foreign staff (1 Swiss and 1 Polish) in addition to the Japanese staff proficient in English who have been with MANA since its inception. With these improvements, MANA has made English its official language and has strengthened its administrative systems to provide researchers with procedural and clerical support in English.

Table 2-3: Breakdown of Nationalities of researchers at MANA.

Japan	77
China	47
India	11
Italy	4
USA	4
France	3
Russia	3
UK	3
Australia	1
Bangladesh	1
Czech	1
Germany	1
Iran	1
Korea	1
Sweden	1
Switzerland	1
Total	**160**
Foreigners	**83**

In addition to the 3 world-renowned researchers who have served as Advisors since MANA's launch, Professor Stucky from the University of California, Santa Barbara was appointed as a 4th Advisor.

To actively and effectively promote comprehensive, objective external evaluations, the MANA Evaluation Committee consisting of 10 stakeholders (6 from foreign institutions; 4 from Japanese institutions) was established. Its activities are outlined in Chapter 7.

Appendix 8.1: MANA Top Management
Appendix 8.2: MANA Research Staff
Appendix 8.3: MANA Advisors
Appendix 8.4: MANA Evaluation Committee

2.2 Retaining Outstanding Researchers

As anticipated at the time of the WPI application, MANA—in addition to the PIs it secured at its inception—has advertised internationally in *Nature* and on its homepage and has held interviews to secure researchers to bolster the research framework. At the same time, the Center has received recommendations through its networks and conducted interviews to hire more researchers.

● **Retention of Outstanding PIs**

10 applicants from around the world applied to our advertisements in *Nature* and other journals, and MANA hired one PI after a document screening and interview: Dr. Enrico Traversa, a professor at the University of Rome's Department of Chemical Science and Technology. Recommendations from MANA's networks led to the appointments of Dr. Liyuan Han from Sharp Corporation and Dr. Kazuhito Tsukagoshi from the National Institute of Advanced Industrial Science and Technology as Principal Investigators.

● **Retention of Young Postdoctoral Researchers**

During FY2008, a total of 58 applications were received for the positions of ICYS-MANA Researcher and MANA Research Associate that were advertised in *Nature* and other journals. After a document screening, the 24 applicants for the ICYS-MANA Researcher position were narrowed down to 7 interview candidates, of whom 3 were successful. One MANA Research Associate was hired from the pool of 34 applicants. MANA intends to continue to hire outstanding post-doctoral researchers in this manner. As a result of these efforts, MANA now boasts 13 ICYS-MANA Researchers, of which 10 are foreigners. There are now 52 MANA Research Associates assigned to work with PIs and Independent Scientists, of which 45 are foreigners. This translates into a total of 65 postdoctoral researchers, of which 55 are foreigners.

● **Retention of Graduate Students**

There are currently 12 graduate student researchers from our partner graduate schools, of which half are foreigners. Discussions are underway concerning the development of a Master's degree curriculum for FY2009 in which all required credits will be taken in English.

● **Foreign Researchers and Female Researchers**

As shown in Table 2-2, the ratio of foreign nationals to the total number of MANA personnel has reached 45%, as of March 31, 2009. Out of 160 researchers, 83, or 52%, are foreigners. The breakdown of nationalities is shown in Table 2-3. In this manner, MANA has developed a multinational group of researchers. The ratio of female researchers to the total number of MANA researchers is 9%. MANA will continue to boost its ratios of foreign and female researchers, because it is vital to further strengthen the Center's diverse group of outstanding researchers.

3. Enhancing the Research Environment

MANA has undertaken the following detailed endeavors in light of its policy for creating an attractive international research environment.

3.1 Promotion of Melting Pot Culture and Cultivation of Young Researchers

● MANA Seminars

In MANA Seminars, PIs and other MANA researchers present their research and field questions. They are held every Friday in the Seminar Room in the MANA Building. Seminars are held on other days when renowned researchers visit the Center, offering opportunities to inspire and stimulate researchers in their respective projects and to promote interdisciplinary synergies. A list of MANA seminars held in 2008 can be found in Appendix 8.5. A total of 79 lectures have been held. Of those, 42 were conducted by MANA researchers and 37 were conducted by renowned researchers from around Japan and the world.

Appendix 8.5: MANA Seminars

Fig. 3-1: Photos taken at MANA Seminars.

● Coffee Breaks

The MANA Building has lounges for free discussion, and there are coffee breaks every afternoon. Researchers are encouraged to take coffee breaks. Gathering around the table for coffee breaks breeds intercultural and interdisciplinary exchange and sows the seeds for new interdisciplinary and cooperative research.

Fig. 3-2: MANA Coffee Break.

● Summer School and International Workshops

From July 28 to August 1, 2008, MANA joined forces with UCLA in the United States and the University of Cambridge in the United Kingdom to operate a nanotechnology summer school for young researchers. 39 researchers from NIMS/MANA and 16 researchers from other institutions participated in the program. Active lectures and discussions on nanotechnology were conducted.

International workshops are invaluable venues for the interaction of young researchers and the convergence of international experience. MANA hosted the **ISATBMS-2008** (International Symposium on Atomic Technology for Biomaterials Science-2008) in June, the **IWSDRM2008** (International Workshop on Superconductivity in Diamond and Related Materials) in July and the **MMC Workshop 2008** (Magnetic Materials Center Workshop 2008) in October. In FY2008, MANA also hosted 5 American university students for 11 weeks in joint program with the NSF in the United States. In FY2009, MANA will host 6 students.

Fig. 3-3: NIMS/MANA – IRC – UCLA/CNSI Summer School 2008.

● **Double-Mentor System**

MANA employs a Double-Mentor system, with 2 mentors from around the world, as part of its human resources development program for young researchers. Mentors provide young researchers with supervision and advice on their research while respecting their free thought and autonomy to the fullest possible extent. Young researchers consult with their mentors and conduct joint research at the overseas institutions to which foreign mentors affiliate. This system is expected to enhance the qualities required for top-level researchers. Furthermore, in July 2008, MANA Advisor and Florida State University Professor Sir Harry Kroto, winner of the Nobel Prize in Chemistry 1996, provided MANA's young researchers with one-on-one supervision.

Fig. 3-4: MANA Advisor Professor Sir Harry Kroto offers one-on-one supervision of young MANA researchers.

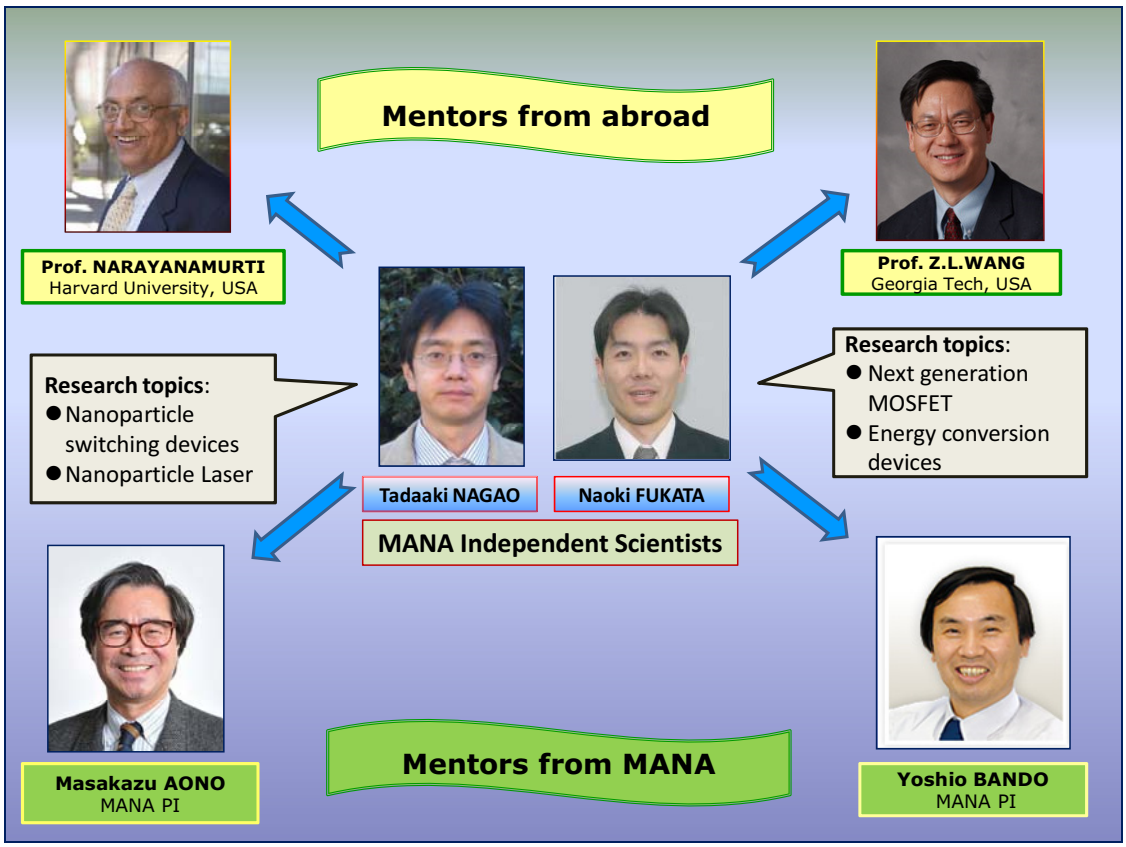


Fig. 3-5: Examples of Double Mentor System of young MANA researchers.

3.2 Support for Research, Administration and Daily Life

● Startup Research Funding

In principle MANA researchers are expected to secure external funding for their research, but given the need for initial funds to conduct research and recruit research staff, MANA PIs, MANA Independent Scientists and ICYS-MANA Researchers have been granted startup research funds. Likewise, PIs at the Satellites are provided with funds for personnel and necessary research expenses.

● Technical Support for Research

A 3-person Technical Support Team has been put in place to assist foreign and Japanese researchers in using world-class, large-scale equipment at MANA and NIMS with ease. They also assist with experiments and conduct maintenance on devices. Operations and maintenance manuals for the shared devices have been translated into English and orientations are held in English to improve convenience. Technical staff with their specialized knowledge is utilized as consultants for experiments that require devices for research. They also manage dangerous and corrosive agents and assist in purchasing devices, machinery and consumables.

Fig. 3-6: MANA Technical Support Staff helps researchers to solve technical problems.

● **Patent Application Assistance**

Expert staff with vast experience handling patent applications for corporations consults researchers about patents and assist them in filing invention reports. Researchers can request MANA staff to write applications and consult about patents in English.

● **Bilingual Administrative Services, Documentation, Guidebooks and Intranet**

Starting last October, two foreign staff was assigned to the Planning Team, and a nearly solid international administrative system is in place. Including foreigners, MANA has hired administrative staff that is fluent in English and has made English the official language of the Center to allow foreign researchers to conduct their research with ease. An English language instruction service is also offered to allow foreign researchers to apply for external funding. At MANA, internal email communication is conducted entirely in English. The English guidebooks "NIMS Research Guide" (concerning research procedures at NIMS) and "Life in NIMS" (containing useful everyday information on opening bank accounts and applying for electricity and gas services etc.) are distributed to foreign researchers. Furthermore, information on MANA Seminars, guidebooks, regulations that pertain to or impact MANA researchers and other necessary information is made available in English on the intranet.

● **Orientations and Laboratory Tours**

NIMS conducts initial training in English for newly hired foreign researchers and holds orientations and laboratory tours for new researchers and graduate students.

Fig. 3-7: Orientation and Laboratory Tour in English for Newcomers.

● **Daily Life Assistance**

Staff proficient in English assist researchers with various everyday problems and questions. NIMS has outsourced daily life support for foreign researchers to an expert company. To provide foreigners a smooth transition to life in Japan, MANA offers Japanese culture and language classes. In FY2008 a total of 126 participants, including MANA researchers and their families, joined these classes.

Appendix 8.6: Japanese Culture and Language Classes

Fig. 3-8: NIMS Summer Festival 2008 at Ninomiya House.

3.3 Improvement of Research Facilities and Equipment

At MANA and NIMS there are many research facilities for common use. In FY2007 two Nanofoundry Facilities at NIMS and MANA were built. In FY2008 solar-powered facilities and equipment for superconductive materials were installed.

In October 2008, the entire 13,000 m^2 of the old Nanomaterials and Biomaterial Research Building was allocated to MANA, and the main researchers are all stationed there. As such, it was renamed the MANA Building. In FY2008, office and lab space was secured for PIs, Independent Scientists, ICYS-MANA Researchers, postdoctoral researchers and graduate students. In order to adapt to the increasing number of foreign scientists, NIMS plans to construct another researcher housing adjacent to the MANA Building.

Fig 3-9: MANA Research Equipment for common use. Left: Field Emission- Transmission Electron Microscope. Right: Laser Raman Micro-spectrometer.

Fig 3-10: The Nanofoundry in the MANA Building.

Fig 3-11: MANA Building.

4. MANA Research Activities

4.1 Research Overview

For an overview of MANA research activities please refer to the booklet **"MANA Research Digest 2008"**. MANA has started to increase multi-disciplinary research as illustrated in Fig. 4-1.

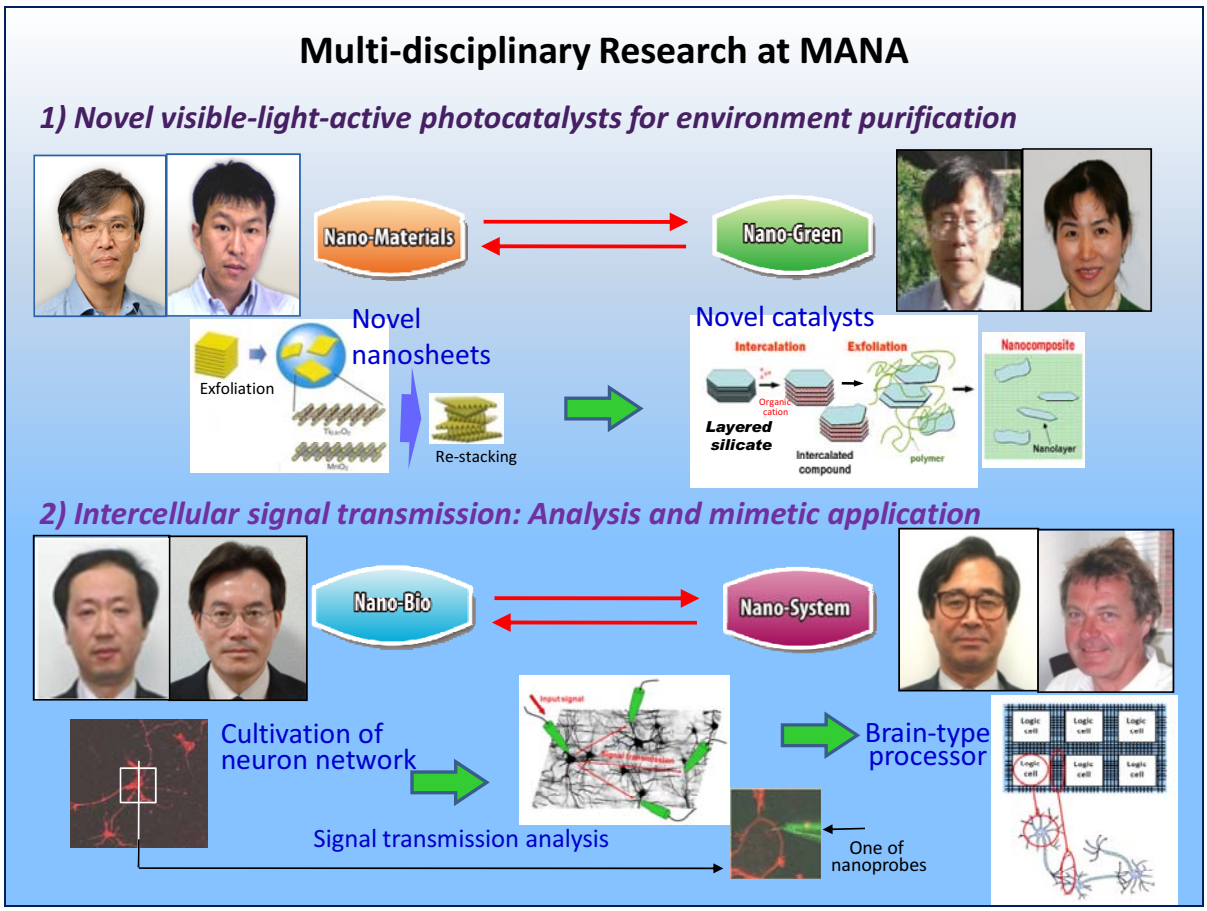


Fig. 4-1: Examples of Multi-disciplinary research at MANA.

4.2 Research Output

● Research Papers

The list of Research Papers shown in Appendix 8.8 contains over 350 publications including papers published in top-tier journals as Nature Physics, Journal of the American Chemical Society, Physical Review Letters and Nano Letters.

Appendix 8.7: Research Papers

● Patents

In addition to writing research papers, MANA members actively apply for patents. The list of Patents shown in Appendix 8.9 contains more than 60 applications for Japanese patents and more than 5 applications for International patents for the time between Oct 2007 and Dec 2008.

Appendix 8.8: Patents

● Commendations

MANA's renowned researchers have received many awards, including PI Dr. Takayoshi Sasaki and MANA Scientist Dr. Minoru Osada who both won the Tsukuba Prize. A list of Commendations between Oct 2007 and Dec 2008 can be found in Appendix 8.10.

Appendix 8.9: Commendations

5. Global Network

5.1 Satellites

MANA has established Satellites as organizations for the assignment of external guest Principal Investigators. All MOU agreements and research contracts required to establish the satellites scheduled at the time of application were concluded by July 2008. Further discussions led to the establishment of a new MANA satellite at Hokkaido University in October 2008, which is headed by PI Professor Kohei Uosaki. In addition, Associate Professor Keiichi Tomishige joined as an additional PI at the University of Tsukuba satellite.

MANA has started concrete joint research projects and personnel exchange with the Satellites. Interaction of MANA young scientists and foreign PIs has begun (Georgia Tech, UCLA, etc).

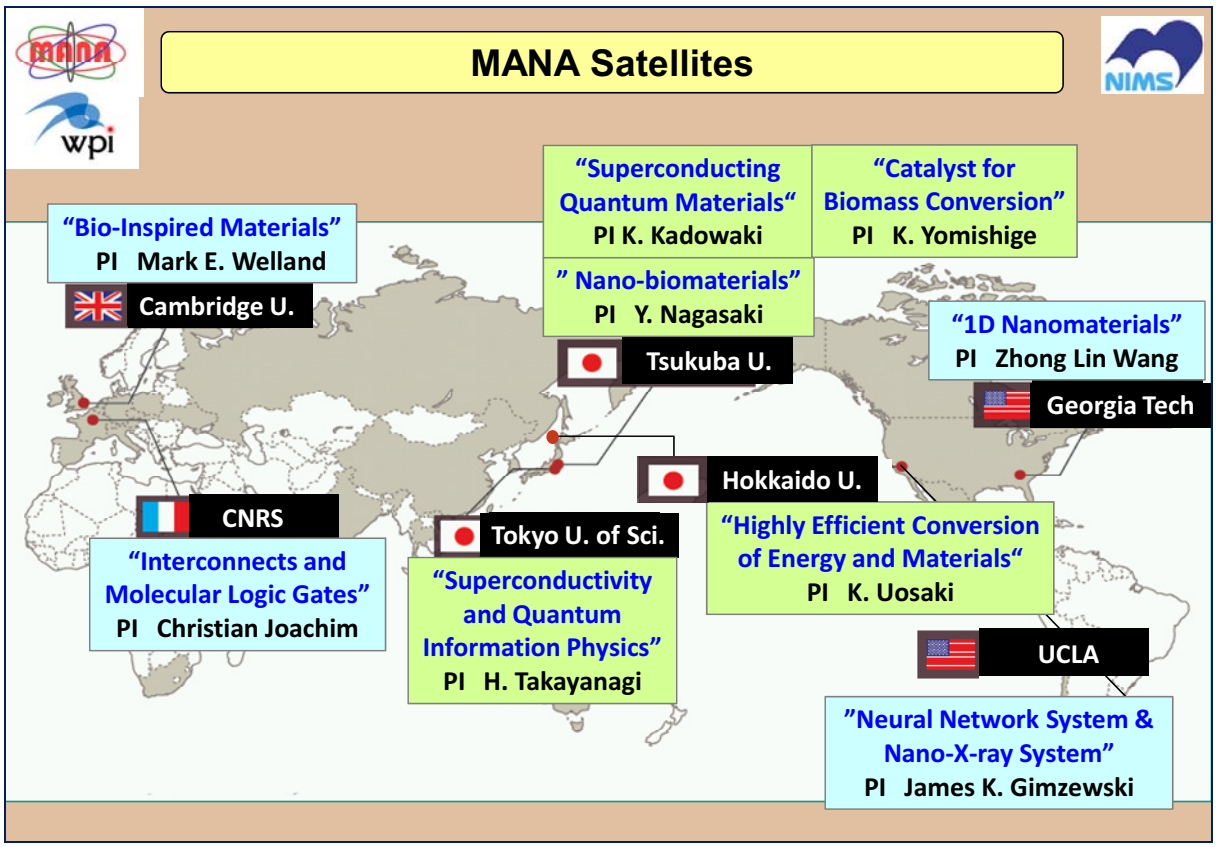


Fig. 5-1: The seven MANA Satellites.

Fig. 5-2: Opening of the MANA Satellite at UCLA. Left: MOU Signing Ceremony in Tokyo (March 2008). Right: Opening of the MANA Satellite Research Facility at UCLA (April 2008).

1. University of Tsukuba (Japan)

An agreement concerning the establishment of the satellite was concluded with the University of Tsukuba in June 2008. The following research and supervision of MANA Independent Scientists are progressing accordingly.

● **Professor Kazuo Kadowaki,** *Graduate School of Pure and Applied Sciences*

Research topics (Nano-System field): Nanoscience research on the use of high temperature superconductivity. Creation of nanostructures by microscopically sculpting high quality single crystal superconductors while controlling the operation of quantum coherences through the use of Josephson junctures.

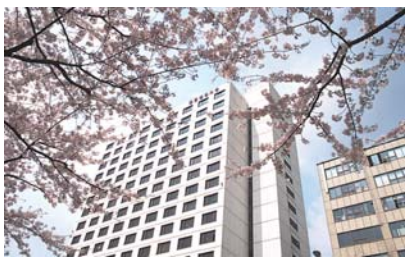
● **Professor Yasuo Nagasaki,** *Graduate School of Pure and Applied Sciences*

Research topics (Nano-Bio field): Research on new nano-bioimaging and materials design for nano-diagnoses and treatment and the evaluation of the attributes of these materials with the aim of creating novel bio tools.

● **Associate Professor Keiichi Tomishige,** *Graduate School of Pure and Applied Sciences*

Research topics (Nano-Green field): Development of catalysts for efficient biomass conversion. Research on creating high value-added fuels to make biomass easier to use and technologies to convert biomass into chemical products.

2. Tokyo University of Science (Japan)



NIMS has signed a contract with the Tokyo University of Science for Professor Takayanagi's dispatch. Research space at MANA has been secured for him so that he can conduct both his TUS research and his MANA research.

● **Professor Hideaki Takayanagi,** *Department of Applied Physics*

Research topics (Nano-System field): Research into nanotechnology for new superconducting devices.

3. Hokkaido University (Japan)

An agreement to establish a satellite and a research contract were signed with Hokkaido University in October 2008. The following research and supervision of MANA young scientists are progressing accordingly.

● **Professor Kohei Uosaki,** *Graduate School of Science, Division of Chemistry*

Research topics (Nano-Green field): Research on establishing methods to align highly controlled atoms and molecules on solid surface aiming to realize energy and highly-efficient conversion processes for materials in interfaces, especially solid-liquid interfaces.

4. UCLA (United States)

The MANA Satellite at the California NanoSystems Institute (CNSI) at University of California, Los Angeles (UCLA) was opened in April 2008. MANA PI, Prof. Gimzewski and his colleagues from UCLA visited MANA for more than 5 weeks in total (August 2008, September 2008, December 2008 and February 2009) to perform MANA research. A MANA post-doc from Tsukuba stayed at UCLA for half a year (October 2008 – March 2009) to perform MANA research.

● **Prof. James K. Gimzewski,**

Director of Nano/Pico Characterization Laboratory

Research topics (Nano-System field): Fusion of nanotechnology and biotechnology, nano X-ray systems. Supervision of MANA Independent Scientists.

5. Georgia Institute of Technology (United States)

The MANA Satellite at the Center for Nanostructure Characterization (CNC) at Georgia Institute of Technology (GIT), Atlanta, USA, was opened in July 2008. MANA PI, Prof. Z.L. Wang from GIT visited MANA in October 2008, November 2008 and February 2009 for detailed discussions about the MANA research. A MANA Independent Scientist from Tsukuba visited GIT in December 2008 and February 2009 to perform MANA research under the supervision of his Mentor, Prof. Z.L. Wang.

● **Prof. Zhong Lin Wang,**

Director of Center for Nanostructure Characterization

Research topics (Nano-Materials field): Fundamental research on the observation and characterization of crystal growth in one-dimensional nanoscale materials to develop nanomaterials with energy applications and the supervision of MANA Independent Scientists.

6. CNRS (France)

The MANA Satellite at the Center for Material Elaboration & Structural Studies (CEMES) at Center national de la recherche scientifique (CNRS) in Toulouse, France, was opened in July 2008. MANA PI, Prof. Christian Joachim and his colleague from CNRS visited MANA in March, June and November 2008 for detailed discussions about the MANA research. From October 2008, CNRS Toulouse employed two new post-docs, one theoretician and one experimental chemist, to perform MANA research.

● **Prof. Christian Joachim,** *Center for Material Elaboration & Structural Studies (CEMES) at CNRS, Toulouse, France*

Research topics (Nano-Systems field): Fundamental research focusing on molecular logic gates and molecular magnetism to develop materials for emerging nanoelectronics, spintronics devices and brain-like computers. Supervision of MANA Independent Scientists.

7. University of Cambridge (United Kingdom)

The MANA Satellite at the Nanoscience Centre at University of Cambridge, UK, was opened in July 2008. From October 2008, three PhD Students have been working on MANA research. One is based at the Nanoscience Centre, University of Cambridge and two are based at University College London.

- **Prof Mark E. Welland,** *Director of Cambridge Nanoscience Centre*

  Research topics (Nano-System field): Creation of materials that use functions of bio systems to exceed those functions (bio-inspired energy efficient materials). Supervision of MANA Independent Scientists.

- **Dr David Bowler,** *Co-Director of the MANA Satellite at the Cambridge Nanoscience Centre*

  Research topics: Development of linear scaling electronic structure methods; interactions of molecules with semiconductor surfaces; bio-inspired systems relevant to energy efficient materials.

5.2 Other International Partnerships

In March 2008, MANA concluded a contract to establish a MANA/NIMS Office at the University of Washington, and both parties have been promoting cooperative activities centered on the overseas offices. To promote research cooperation exchange with overseas research institutions. In 2008 MANA has sealed 9 MOUs with foreign institutions as shown in Appendix 8.11. In order to promote international collaboration it is vital that MANA continues to adequately utilize the global networks and alumni organizations developed under the ICYS project. MANA will continue promoting a global exchange of persons through international university collaboration with the NIMS International Joint Graduate School Program and by encouraging short and mid-term intake of outstanding international researchers with the NIMS Open Research Institute Program. MANA will continue planning and deliberating the establishment of the World Nanotechnology Research Institute Forum (WNRIF) in order to strengthen ties with top-level nanotechnology research organizations. MANA will continue discussing WNRIF with potential partners, and it intends to conclude MOUs with them in turn.

Appendix 8.10: International Cooperation

Fig. 5-3: MANA/NIMS Office at the University of Washington.

6. External Information Dissemination and Publicity

6.1 MANA International Symposium

The MANA International Symposium is held every year to promote the research achievements of the MANA project. The First MANA International Symposium was held on March 10-13, 2008. Including MANA PIs and Independent Scientists, a total of 191 participants from around the world attended the symposium and engaged in vigorous discussions. The Second MANA International Symposium was held on February 25-27, 2009, with a total of 310 participants.

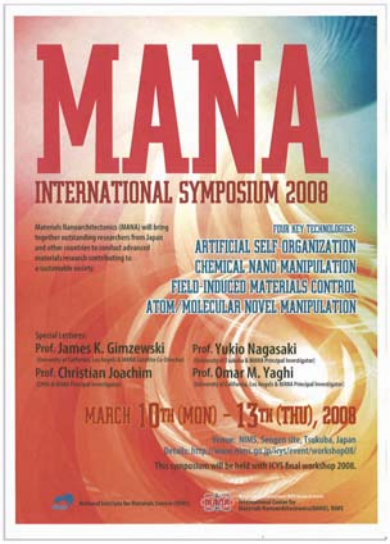


Fig. 6-1: The First MANA International Symposium 2008.

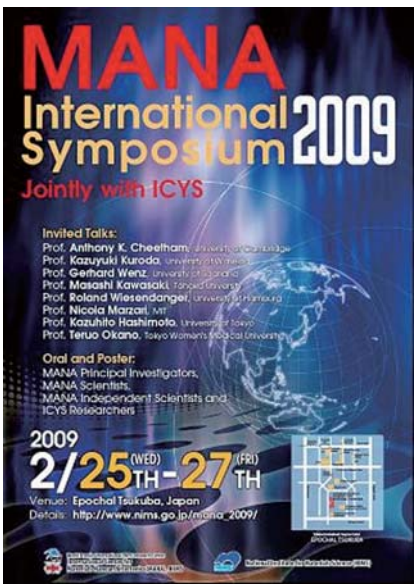


Fig. 6-2: The Second MANA International Symposium 2009.

6.2 Website

A few months after opening, in February 2008, MANA launched its official webpage at http://www.nims.go.jp/mana/. The website provides an overview of MANA, introduces projects, advertises for researchers, publicizes events and showcases research output and recent news. A wide array of information is made available to the public, and MANA will continue working to enhance content.

6.3 Newsletter

The first issue of the MANA newsletter named "CONVERGENCE" was published in February 2009. CONVERGENCE will be published with separate English and Japanese versions three times per year and will cover MANA research activities, output and special topics. Interviews with famous researchers and articles about top-ranked institutions in Japan and the world are preparation with the aim of allowing even the casual reader to gain an affinity with MANA. In order to boost MANA's global name recognition and contribute to expanding its global networks, approximately 4000 copies of the English and Japanese versions of CONVERGENCE will be distributed to research institutions and researchers in 71 countries.

"Convergence" (English version)

"Convergence" (Japanese version)

Fig. 6-3: First Issue of the MANA newsletter "Convergence"

6.4 Media Coverage

As shown in Appendix 8.12, MANA has been featured in newspaper articles, on television and in international academic journals.

Appendix 8.11: Media Coverage

Fig. 6-4: A Conversation with MANA General-Director Aono in the American Chemical Society's *ACS Nano* (Dec 2007).

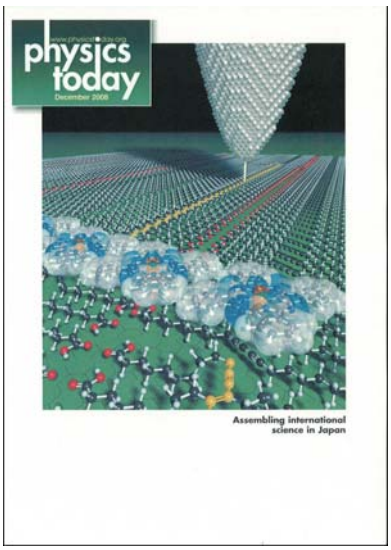


Fig. 6-5: MANA General-Director Aono's work on the cover of the December 2008 issue of *Physics Today*.

Fig. 6-6: MANA on NHK News "Ohayou Nippon (Good morning Japan)" on December 11, 2008.

6.5 Visitors at MANA

From April to December 2008, 133 visitors from around the world (46 from EU, 38 from USA, 38 from Asia and 11 from other regions) have visited MANA. Officials from foreign governments and research institutions, including the Chairman of the Board of Karlsruhe Institute of Technology, the Undersecretary of Stale of the Polish Ministry of Science and Higher Education, and the Director of the Agency for Science, Technology and Research, Singapore have visited MANA, which is evidence for the sincere interest garnered by the Center overseas.

Appendix 8.12: Visitors at MANA

Fig. 6-7: MANA Visit of Prof. Krzysztof J. Kurzydlowski, Ministry of Science and Higher Education in Poland (left) and Dr. Adnan Akay, National Science Foundation, USA (right).

Fig. 6-8: Visitors of the Nanofoundry in the MANA Building.

6.6 MANA Activities

The MANA History between October 2007 and February 2009 together with photos from MANA Events can be found in Appendix 8.13.

Appendix 8.13: MANA History with photos

7. Committee Evaluations

7.1 MANA Evaluation Committee

An Evaluation Committee consisting of 10 experts from foreign and Japanese institutions held its first meeting on March 12, 2008, to evaluate MANA operations and research planning.

Appendix 8.14: Comments of MANA Evaluation Committee

7.2 WPI Program Committee

The WPI Program Committee conducted an on-site inspection on April 16, 2008, and the WPI Follow-Up Committee convened on May 20, 2008. As a result of this assessment, comments on WPI Program Center concept progress for FY2007 were presented to MANA and the other four program centers. On November 27-28, 2008, WPI Program Committee conducted another on-site inspection, issued its Center Concept Progress Report for FY2008, and held discussions thereupon.

Appendix 8.15: Comments of WPI Program Committee

Fig. 7-1: WPI Program Director Prof. Toshio Kuroki and WPI Program Officer Prof. Gunji Saito at the MANA on-site inspection (Nov 27-28, 2008).

Appendix 8.1: MANA Top Management

Teruo KISHI
NIMS President
MANA Chief Project Officer

Masakazu AONO
MANA Director- General

Yoshio BANDO
MANA Chief Operating Officer

Takahiro FUJITA
MANA Administrative Director

Appendix 8.2: MANA Research Staff

MANA Principal Investigators (30):

Nano-Materials Field (11)

Coordinator

Takayoshi SASAKI
NIMS

Katsuhiko ARIGA
NIMS

Yoshio BANDO
NIMS

Dmitri GOLBERG
NIMS

Kazuhiro HONO
NIMS

Kenji KITAMURA
NIMS

Eiji TAKAYAMA-MUROMACHI
NIMS

Naoki OHASHI
NIMS

Yoshio SAKKA
NIMS

Zhong Lin WANG
Georgia Tech (Satellite)

Omar YAGHI
UCLA

Nano-System Field (12)

Coordinator

Masakazu AONO
NIMS

Daisuke FUJITA
NIMS

Christoph GERBER
Univ. Basel

James K. GIMZEWSKI
UCLA (Satellite)

Tsuyoshi HASEGAWA
NIMS

Xiao HU
NIMS

Christian JOACHIM
CNRS (Satellite)

Kazuo KADOWAKI
Univ. Tsukuba (Satellite)

Tomonobu NAKAYAMA
NIMS

Hideaki TAKAYANAGI
Tokyo Univ. Sci. (Satellite)

Kazuhito TSUKAGOSHI
NIMS

Mark WELLAND
Univ. Cambridge (Satellite)

Nano-Green Field (5)

Coordinator

Kohei UOSAKI
Hokkaido Univ. (Satellite)

Liyuan HAN
NIMS

Keiichi TOMISHIGE
Univ. Tsukuba (Satellite)

Enrico TRAVERSA
NIMS

Jinhua YE
NIMS

Nano-Bio (2)

Coordinator

Yuji MIYAHARA
NIMS

Yukio NAGASAKI
Univ. Tsukuba (Satellite)

MANA Scientists (47):

*MANA Scientist until September 2008.

Nano-Materials Field (18)


Yutaka ADACHI*


Yasuo EBINA


Jonathan HILL


Noriyuki HIROTA*


Renzi MA


Masanori MITOME


Takao MORI


Tsuyoshi OHNISHI


Minoru OSADA


Tadashi OZAWA


Isao SAKAGUCHI*


Hiroya SAKURAI*


Naoto SHIRAHATA*


Ryutaro SOUDA


Kazunori TAKADA


Chengchun TANG


Kentaro TASHIRO


Chunyi ZHI

Nano-Systems Field (11)


Masanori KOHNO


Osamu KUBO


Katsumi NAGAOKA


Yuji OKAWA


Keisuke SAGIZAKA*


Makoto SAKURAI


Yoshitaka SHINGAYA


Akihiro TANAKA


Kazuya TERABE


Tohru TSURUOKA


Takashi UCHIHASHI

Nano-Green Field (3)


Emiliana FABBRI


Ashraful ISLAM


Daniele PERGOLESI

Nano-Bio Field (15)


Guoping CHEN


Sachiko HIROMOTO


Chiho KATAOKA


Kohsaku KAWAKAMI


Naoki KAWAZOE


Masanori KIKUCHI


Norio MARUYAMA


Junko OKUDA


Martin PUMERA


Yoko SHIRAI


Yasushi SUETSUGU


Tetsushi TAGUCHI


Akiyoshi TANIGUCHI


Akiko YAMAMOTO


Tomohiko YAMAZAKI

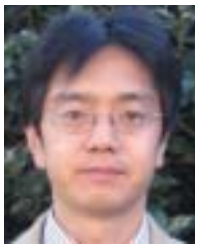
MANA Independent Scientists (12):


Alexei A. BELIK


Naoki FUKATA


Masayoshi HIGUCHI


Satoshi MORIYAMA


Tadaaki NAGAO


Jun NAKANISHI


Yoshitaka TATEYAMA


Shunsuke TSUDA


Lionel VAYSSIERES


Ajayan VINU


Yusuke YAMAUCHI


Chiaki YOSHIKAWA

ICYS-MANA Researchers (13):


Somobrata ACHARYA


Richard CHARVET


Jun CHEN


Xiaosheng FANG


Ujjal K. GAUTAM


Cesar P. GOMEZ


Masataka IMURA


Michael V. LEE


Canhua LIU


Roberto SCIPIONI


Tatsuo SHIBATA


Yasuhiro SHIRAI


Pavuluri SRINIVASU

MANA Research Associates (52):

Nano-Materials Field (28)

Dmitriy ALEXANDROVICH	Russia
Anasuya BANDYOPADHYAY	India
Parayalil CHITHRA	India
Weihua DI	China
Dominik ENDERS	Germany
Yanfeng GUO	China
Chunfeng HU	China
Qinmin JI	China
Baoping JIA	China
Chun LI	China
Baoe LI	China
Jian-Yong LI	China
Jianbo LIANG	China
Sathish MARAPPAN	India
Chamini MENDIS	Australia
Gopalan RAGHAVAN	India
Vijaykarthik SANKAR	India
Youguo SHI	China
Tongik SHIN	Korea
Pothiappan VAIRAPRAKASH	India
Vaithilingam VEERAPPAN	India
Mingsheng WANG	China
Xijin XU	China
Zhi XU	China
Yongzhao YAO	China
Haibo ZENG	China
Li ZHANG	China
Yuhua ZHEN	China

Nano-Systems Field (15)

Jian-Hua GAO	China
Xinli GUO	China
Shu-jun HU	China
Chuanbo LI	China
Bin LIU	China
Mengbo LUO	China
Swapan Kumar MANDAL	India
Nozomi NISHIZAWA	Japan
Takeo OHNO	Japan
Keisuke SATO	Japan
Hiroyuki TOMIMOTO	Japan
Shouming WU	China
Yong YANG	China
Genki YOSHIKAWA	Japan
Liping ZHAO	China

Nano-Green Field (8)

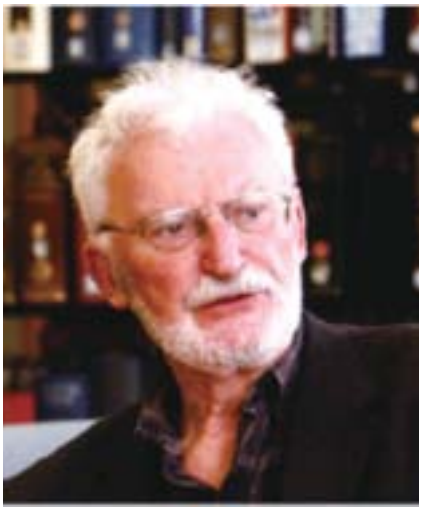
Stefan COOK	UK
Shang GAO	China
Chunping HU	China
Aminian Mohsen KHAJEH	Iran
Xiukai LI	China
Hua TONG	China
Liang WANG	China
Keiichi YOSHIMATSU	Japan

Nano-Bio Field (1)

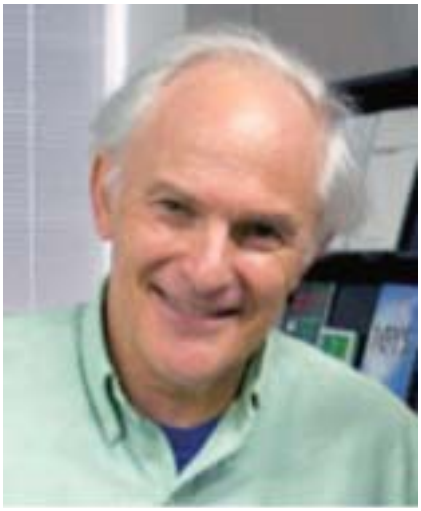
Shingo KANEKO	Japan

Appendix 8.3: MANA Advisors

Advisors such as Nobel Prize Winners and world prominent researchers, provide their experience and guide MANA researchers and scientists.

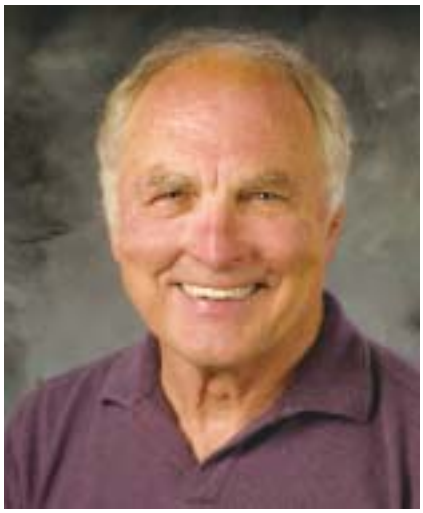


Prof. Heinrich Rohrer
1986 Nobel Prize Winner in Physics
Switzerland



Prof. Sir Harry Kroto
1996 Nobel Prize Winner in Chemistry
Florida State University
USA

Prof. C.N.R. Rao
Honorary President of the
Jawaharlal Nehru Centre
for Advanced Scientific Research
India



Prof. Galen D. Stucky
University of California
Santa Barbara
USA

Appendix 8.4: MANA Evaluation Committee

Evaluation Committee members provide us their critical comments and expert recommendations on the operation and research strategy of the MANA project.

Chair

Anthony K. Cheetham
Professor
University of Cambridge,
UK

Takuzo Aida
Professor
University of Tokyo,
Japan

Morinobu Endo
Professor
Shinshu University,
Japan

Horst Hahn
Professor
Forschungszentrum Karlsruhe,
Germany

Kazuhito Hashimoto
Professor
University of Tokyo,
Japan

Yoshio Nishi
Professor
Stanford University,
USA

Manfred Ruehle
Professor
Max Planck Institute,
Germany

Rodney S. Ruoff
Professor
The University of Texas,
USA

Louis Schlapbach
Professor
Director of Empa,
Switzerland

Kazunori Tanaka
Principal Fellow, JST
Center for Research and
Development Strategy
Japan

Appendix 8.5: MANA Seminars

List of MANA Seminars 2008:

Date (2008)	Speaker	Title
Feb 22	**Dr. Heinrich Rohrer** Nobel Laureat in Phyics 1986 MANA Advisor, Switzerland	Nanotechnology, a Key to Sustainability
Apr 11	**Dr. Cesar Pay Gomez** ICYS-MANA Researcher	Disordered Structures of the TM-Mg-Zn 1/1 quasicrystal approximants (TM = Hf, Zr or Ti) and Chemical Intergrowth
	Prof. Bruce Hamilton Photon Science Institute, the University of Manchester, UK	Nano Imaging and Spectroscopy of Wide Gap Solids
Apr 18	**Dr. Yoshitaka Tateyama** MANA Independent Scientist	TDDFT linear-response calculation of excitation spectra of molecule in aqueous solution
	Dr. Chiaki Yoshikawa MANA Independent Scientist	Protein and Cell Adhesions on Well-Defined, Concentrated Polymer Brushes
Apr 25	**Dr. Yasuhiro Shirai** ICYS-MANA Researcher	Molecule-based functional systems: “Nano-machines” and “Molecular Electronic Devices”
	Dr. Shunsuke Tsuda MANA Independent Scientist	High-pressure-high-temperature synthesis of boron doped SiC
May 9	**Dr. Liu Canhua** ICYS-MANA Researcher	Self-alignment of Co atoms by one-dimensional substrate mediated interaction
	Dr. Michael Lee ICYS-MANA Researcher	Templated bottom-up fabrication with conductive polymers
May 16	**Dr. Masataka Imura** ICYS-MANA Researcher	Optoelectronic Devices with UV region Based on AlN and Diamond Wide-bandgap Semiconductors
	Prof. Niels F. Pedersen Technical University of Denmark, Denmark	THz generation using Fluxon dynamics in high temperature superconductor Josephson junctions
May 23	**Dr. Jonathan Hill** MANA Scientist	Structure and Properties of Phenol-Substituted Porphyrins and Oxoporphyrinogens
	Dr. Masayoshi Higuchi MANA Independent Scientist	Electrochromic Functions of Organic-Metallic Hybrid Polymers
May 29	**Dr. E. Søndergård** CRNS/ Saint-Gobain, France	Nanostructures and functional glass surfaces
May 30	**Dr. Richard Charvet** ICYS-MANA Researcher	Supramolecular p/n Heterojunctions from Self-assembled Block
	Prof. Enrico Traversa Materials Science and Technology University of Rome, Italia	Nanostructured Materials for Fuel Cells
Jun 5	**Dr. Jacques Bonvoisin** NanoSciences Group, CEMES/CNRS, France	Towards a molecular SWAP made of a ruthenium complex
Jun 6	**Dr. Roberto Scipioni** ICYS-MANA Researcher	1. Stabilization mechanisms in Carbon Nanomaterials 2. Shizuwo: ICYS LINUX Computing Cluster
	Prof. S. B. Halligudi Deputy Director, National Chemical Laboratory, India	Novel inorganic-organic hybrid materials and their catalytic functions

Jun 13	**Dr. Somobrata Acharya** ICYS-MANA Researcher	Ultrahigh Density Hard Materials Assemblies
	Dr. Tadaaki. Nagao MANA Independent Scientist	Nano-scale Bismuth Films
Jun 20	**Dr. Yusuke Yamauchi** MANA Independent Scientist	Beyond Silica: New Trend of Mesoporous Metals
	Dr. Alexei Belik MANA Independent Scientist	Effects of doping on structural, physical, and chemical properties of multiferroic $BiMnO_3$ and $BiCrO_3$.
Jun 27	**Dr. Noriyuki Hirota** MANA Scientist	Introduction of the magneto-science: Magnetic force effects on feeble magnetic materials
	Dr. Takayoshi Sasaki MANA Principal Investigator	Nanosheets. –Synthesis and Their Layer-by-Layer Assembly into Functional Nanostructured Systems
Jul 3	**Dr. Lakshmi Kantam** Deputy Director & Head Inorganic & Physical Chemistry, Indian Institute of Chem. Tech., India	Green Synthesis using Novel Materials
	Dr. K. V. R. Chary Indian Institute of Chemical Technology, India	Niobium Oxide as a Catalyst Support: Characterization and Catalytic Properties
Jul 4	**Dr. Kentaro Tashiro** MANA Scientist	Molecular and Materials Sciences of π-Electronic Compounds
	Prof. Yuval Golan Ilse Katz Institute for Nanoscience & Nanotechnology, Ben-Gurion University, Negev, Israel	Chemical Epitaxy - From Nanocrystalline to Monocrystalline Semiconductor Thin Films
Jul 7	**Prof. Christine Luscombe** University of Washington, Materials Science & Engineering, USA	Nanostructures for Organic Photovoltaic Devices
Jul 11	**Dr. Jun Nakanishi** MANA Independent Scientist	Photodegradable Tethers at Interfaces: Patterning and drug delivery system
	Dr. Makoto Sakurai MANA Scientist	Nanoscale characterization and application using photon-STM
Jul 16	**Prof. Alexander V. Neimark** Dept. of Chem. & Biochemical Engineering, Rutgers, The State University of New Jersey, USA	Recent Advances in Characterization of Nanoporous Materials
Jul 18	**Dr. Naoki Fukata** MANA Independent Scientist	Doping of B acceptors and P donors in silicon nanowires
	Dr. Masanori Kohno MANA Scientist	Fractional spin excitations in spatially anisotropic frustrated antiferromagnets
Jul 25	**Dr. Tohru Tsuruoka** MANA Scientist	SPM-based optical spectroscopy of single semiconductor nanostructures
	Dr. Hiroya Sakurai MANA Scientist	Magnetic & Electric Phase Diagram of $Ca_{1-x}Na_xV_2O_4$
Aug 20	**Prof. James K. Gimzewski** MANA Principal Investigator, UCLA, USA	STM of Decacyclene and Hexa t-Butyl Decacyclene molecules: A Four-state Single Molecular Switch

Aug 26	**Dr. Tulsi Mukherjee** Director, Chemistry Group, Bhabha Atomic Research Center, India	Research in nanoparticles in Chemistry Group
Sep 1	**Prof. Eunkyoung Kim** Dept of Chemical Engineering, Yonsei University, Korea	Chromogenic molecules for organic switching devices
	Prof. Cheolmin Park Advanced Materials Science and Engineering, Yonsei Univ, Korea	Self Assembled Polymer Nanostructures for Organic Electronics
Sep 3	**Dr. Mark Elsegood** Department of Chemistry Loughborough University, UK	Linking metal complexes in the solid state and other adventures in chemical crystallography
Sep 5	**Prof. Marc-Olivier Coppens** Rensselaer Polytechnic Institute Dept. of Chemical and Biological Engineering, USA	Design and Synthesis of Hierarchically Structured Porous Catalysts
	Prof. Harry L. Anderson University of Oxford, UK	Supramolecular designs of molecular wires
Sep 9	**Prof. Jean-Pierre Sauvage** University Louis Pasteur, France	From Chemical Topology to Molecular Machines
Sep 12	**Dr. Ujjal K. Gautam** ICYS-MANA Researcher	One dimensional ZnS based core-shell heterostructures: synthesis, properties and possibilities
	Dr. Naoto Shirahata MANA Scientist	Room-temperature Solution Synthesis of Highly-luminescent Silicon Nanoparticles
Sep 16	**Dr. Kenneth M. Beck** William R. Wiley Environmental Molecular Sciences Lab., Pacific Northwest National Laboratory, USA	Environmental Research at EMSL (Environmental Molecular Science Lab)
Sep 19	**Prof. Ivan Ošt'ádal** Department of Surface and Plasma Physics, Charles University in Prague, Czech Republik	Growing metals on silicon surfaces - STM study in vivo
Sep 26	**Dr. Lionel Vayssieres** MANA Independent Scientist	Metal Oxide Quantum Rods & Dots Structures & Devices: Design, & Electronic Structure
	Prof. Shankar Narayanan Ekkanath Madathil University of Sheffield, UK	Power Microelectronics – My perspective
Oct 3	**Dr. Takao Mori** MANA Scientist	Developing Novel Functions in Atomic Network Compounds
	Dr. Takashi Uchihashi MANA Scientist	Electronic Tuning of the Kondo Effect with Magnetic Quantum Wells
Oct 10	**Dr. Satoshi Moriyama** MANA Independent Scientist	Spatially resolved Raman spectroscopy and phonon dispersion of graphene and graphene layers
	Dr. Martin Pumera MANA Scientist	Towards Ultrasensitive Method for Determination of Impurities in Carbon Nanotubes
Oct 14	**Prof. Chin-Kun Hu** Institute of Physics, Academia Sinica, China	Molecular Models of Biological Evolution

Oct 21	**Prof. Zhong lin Wang** MANA Principal Investigator, Georgia Institute of Technology, USA	Nanogenerators, nanopiezotronics and biomimicking nanotechnology
Oct 23	**Prof. Victor S.-Y. Lin** Dept. of Chemistry, U.S. DOE Ames Laboratory, Iowa State University, USA	Mesoporous Silica Nanoparticles for Transmembrane Delivery, Sequestration, and Bioenergy Applications
Oct 24	**Prof. David E. Laughlin** Materials Science Engineering Carnegie-Mellon University, USA	The Role of Materials Science in the Continued Increase of Magnetic Recording Density
Oct 31	**Prof. Kunio Takayanagi** Graduate School of Science and Engineering / Physics, Tokyo Institute of Technology, Japan	Nano-materials phases: structure, quantization, carrier transport
Nov 7	**Dr. Minoru Osada** MANA Scientist	Two-dimensional Oxide Nanosheets: New Solution to Nanoelectronics
	Prof. Hideaki Takayanagi MANA Principal Investigator, Tokyo University of Science, Department of Applied Physics, Japan	Recent Progress in Superconducting Qubits
Nov 10	**Dr. Emilio Mendez** Director of the Center for Functional Nanomaterials (CFN), Brookhaven National Laboratory, USA	Overview of the Center for Functional Nanomaterials (CFN)
Nov 14	**Prof. Richard Berndt** University of Kiel, Germany	Probing magnetic clusters and molecular switches with low-temperature STM
Nov 21	**Dr. Yoshitaka Shingaya** MANA Scientist	Single molecule detection with new SERS probe
	Dr. Renzhi Ma MANA Scientist	A Topochemical Approach to Transition Metal Layered Double Hydroxide (LDH) Nanosheets
Nov 28	**Prof. György Mihály** Department of Physics, Budapest University of Technology and Economics, Hungary	Spin polarized currents
	Prof. Christian Joachim MANA Satellite Principal Investigator, CNRS Toulouse, France	Single molecule mechanics on a metal surface
Dec 1	**Dr. Oliver Groening** Swiss Federal Laboratories for Materials Testing and Research, EMPA, Switzerland	Atomic template surfaces for guided self-assembly of organic molecules
	Prof. Goran Karapetrov Materials Science Division, Argonne National Laboratory, USA	Vortex Transitions in Hybrid Mesoscopic Superconductors

Dec 2	**Dr. Hsiao-hua (Bruce) Yu** Unit Leader, Yu Initiative Research Unit, RIKEN Advanced Science Institute, Japan	Molecular Conductive Building Blocks for Biomaterials Science and Engineering
	Prof. Myongsoo Lee Department of Chemistry, Yonsei University, China	Self-Assembly of Rigid-Flexible Block Molecules toward Dynamic Nanostructures
Dec 5	**Dr. Chunyi Zhi** MANA Scientist	Towards highly thermo-conductive electrically insulating polymeric composites with boron nitride nanotubes as fillers
	Prof. Keiichi Tomishige MANA Principal Investigator, Institute of Materials Science, University of Tsukuba, Japan	Catalytic conversion of biomass to fuels and value-added chemicals
Dec 11	**Dr. John A. Dagata** National Institute of Standards and Technology, USA	Scanning probe microscopy in fluid environments: From nanocells to red blood cells
Dec 12	**Prof. Mietek Jaroniec** Department of Chemistry, Kent State University, USA	Major Advances in Chemistry of Ordered Nanoporous Materials
Dec 15	**Dr. Thomas A. Jung** Head, Molecular Nanoscience Laboratory for Micro- and Nanotechnology, Paul Scherrer Institute, Switzerland	Supra-Molecular Self Assembly at Surfaces: Rational Architectures for Addressable Molecular Switches
Dec 16	**Prof. Ayyappanpillai Ajayaghosh** National Institute for Interdisciplinary Science and Technology (NIIST), India	Fluorescence Modulation of π-Conjugated Molecules via Gelation and Energy Transfer
Dec 19	**Prof. Kazuo Kadowaki** MANA Principal Investigator, Institute of Materials Science, Graduate School of Pure and Applied Sciences, University of Tsukuba, Japan	THz Wave Generation form High-T_c Superconductor $Bi_2Sr_2CaCu_2O_{8+x}$ Intrinsic Josephson Junctions

Appendix 8.6: Japanese Culture and Language Classes

Schedule of Japanese Culture Classes 2008:

Date	Class Name	Number of Participants
Apr 6	Flower Arrangement	10
Jul 2	Japanese Gastronomy and Manner	16
Jul 28	Japanese Drums	8
Jul 30	Japanese Drums	8
Sep 25	Tea Ceremony	9
Oct 27	Pottery	7
Nov 17	Pottery	8
Dec 1	Calligraphy	10

Participants of Japanese Language Classes 2008:

Japanese Language Class (one time per week):

Namiki Site	Number of Participants
Introductory Level	5
Beginner Level	3

Sengen Site	Number of Participants
Introductory Level	10
Beginner Level	4

Japanese Language Class (two times per week):

Namiki Site	Number of Participants
Introductory Level	12
Beginner Level	3

Sengen Site	Number of Participants
Introductory Level	10
Beginner Level	3

Appendix 8.7: Research Papers

List of Research Papers 2008:

1	S. Acharya, K. Ariga, *Electric-field Assisted Assembly of Ultra-narrow CdS Nanomaterials*, Asian J. Phys. **17**, 97 (2008).
2	S. Acharya, U. K. Gautam, T. Sasaki, Y. Bando, Y. Golan, K. Ariga, *Ultranarrow PbS rods with intense fluorescence*, J. Am. Chem. Soc. **130**, 4594 (2008).
3	Y. Adachi, N. Ohashi, T. Ohnishi, T. Ohgaki, I. Sakaguchi, H. Haneda, M. Lippmaa, *Change in polarity of zinc oxide films grown on sapphire substrates without insertion of any buffer layer*, J. Mater. Res. **23**, 3269 (2008).
4	K. Akatsuka, G. Takanashi, Y. Ebina, N. Sakai, M. Haga, T. Sasaki, *Electrochemical and Photoelectrochemical Study on Exfoliated Nb_3O_8 Nanosheets*, J. Phys. Chem. Sol. **69**, 1288 (2008).
5	T. Akazaki, M. Yamaguchi, K. Tsumura, S. Nomura, H. Takayanagi, *Negative photoconductivity in $In_{0.52}Al_{0.48}As/In_{0.7}Ga_{0.3}As$ heterostructures*, Physica E **40**, 1341 (2008).
6	S. Alam, S.K. Mondal, J.P. Hill, A. Vinu, *Iron Oxide Magnetic Nanoparticles Confined in Mesoporous Silica and Carbon Materials*, World Scientific Publishing, Singapore, 519-528 (2008).
7	C. Anand, P. Srinivasu, S. Alam, V.V. Balasubramanian, D.P. Sawant, M. Palanichamy, V. Murugesan, A. Vinu, *Highly active three dimensional cage type mesoporous ferrosilicate catalysts for the friedel-crafts alkylation*, Microp. Mesop. Mater. **111**, 72 (2008).
8	K. Ariga, *Molecular Arrays and Patterns for Supramolecular Materials*, J. Photopolym Sci. Technol. **21**, 553 (2008).
9	K. Ariga, *Fabrication and Function of Bio-Hybrid Nanomaterials Prepared via Supramolecular Approaches*, Biomaterials Fabrication and Processing Handbook, Editor: P. K. Chu and X. Liu, Publisher: Taylor and Francis / CRC Press, Boca Raton, **Chapter 12**, p.335-366 (2008).
10	K. Ariga, J.P. Hill, Q. Ji, *Biomaterials and Biofunctionality in Layered Macromolecular Assemblies*, Macromol. Biosci. **8**, 981 (2008).
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Appendix 8.8: Patents

List of Japanese Patent Applications (October 2007 – December 2008):

No.	Name of Invention	Application Number	Date of Application
1	Method of mass production of ZnO nanowires	2007-272490	2007 Oct 19
2	Thermally stable resin composition having excellent mechanical properties and process for production thereof	2007-275072	2007 Oct 23
3	Co based Heusler alloy half-metal	2007-276353	2007 Oct 24
4	A metal compound probe for Raman spectroscopy	2007-276691	2007 Oct 24
5	Gel of BN nanotubes, alkylation of BN nanotubes and their fabrication process	2007-282523	2007 Oct 30
6	Synthetic method for anion-exchangeable layered double hydroxides	2007-314339	2007 Dec 5
7	A nanoscale pH sensor	2007-323034	2007 Dec 14
8	Optical devices and their applications to display devices	2007-325022	2007 Dec 17
9	High strength sintered steel	2007-329408	2007 Dec 21
10	Mesoporous Carbon (MC-MCM-48) and Method for Producing the Same	2007-334245	2007 Dec 26
11	Cage Type Mesoporous Silica (SNC-2), Method for Producing the Same and Absorbent Using the Same	2007-334246	2007 Dec 26
12	Mesoporous Carbon (CNP-2) and Method for Producing the Same	2007-334247	2007 Dec 26
13	BN nanofibers and their fabrication process	2007-336861	2007 Dec 27
14	Dope solution for molding	2008-000645	2008 Jan 7
15	Swellable layered double hydroxides and sol, gel and nanosheets derived from them	2008-012914	2008 Jan 23
16	Layered oxide phosphors and oxide nanosheet phosphors	2008-014606	2008 Jan 25
17	Layered rare-earth hydroxides and their photoluminescent material	2008-025833	2008 Feb 6
18	Synthetic method of layered rare-earth hydroxides	2008-025834	2008 Feb 6
19	Rechargeable solid-state lithium battery	2008-032828	2008 Feb 14
20	Electrode element, method of manufacturing electrode element, and lithium ion secondary battery	2008-036537	2008 Feb 18
21	Frequency conversion devices made of lithium tantalite single crystal	2008-039835	2008 Feb 21
22	Cobalt hydroxide crystals, cobalt hydroxide unilamellar nanosheets and their fabrication process	2008-043681	2008 Feb 26
23	Layered double hydroxides and their delaminated nanosheets	2008-043681	2008 Feb 26
24	Electronic devices and method of their fabrication	2008-054671	2008 Mar 5
25	An instrument for sample preparation and characterization	2008-062344	2008 Mar 12
26	Storage media, recording system, and methods for data recording and erasing	2008-054917	2008 Mar 13
27	Apparatus for producing artificial opal film	2008-076953	2008 Mar 25
28	Characterization methods for substrates of semiconductor solid solutions	2008-079863	2008 Mar 26
29	Fabrication method of nano electron emitters	2008-080358	2008 Mar 26
30	Metal-doped Mesoporous Silica (MeKIT-5) and Method for Producing the Same	2008-100264	2008 Apr 8

31	Polymer electrolytes having excellent mechanical properties, dimension stabilities and their fabrication process	2008-110103	2008 Apr 21
32	Polarization-tailored devices	2008-118118	2008 Apr 30
33	Transparent magnetic films, reading techniques for magnetic patterns, fabrication methods for transparent magnets, and magnetic patterns	2008-118785	2008 Apr 30
34	Synthetic method of anion-exchangeable layered double hydroxides	2008-119873	2008 May 1
35	TiN-based crystals and their bonding bodies	2008-131424	2008 May 20
36	Transparent magnetic films, reading techniques for magnetic patterns, fabrication methods for transparent magnets, and magnetic patterns	2008-135379	2008 May 23
37	TiN-based crystals	2008-131429	2008 Jun 5
38	Photocatalytic nanosheets and their coating films	2008-147592	2008 Jun 5
39	Electro-magnetic absorbers	2008-151636	2008 Jun 10
40	Superconducting sintered bodies and their preparation method	2008-170178	2008 Jun 30
41	Nanosheet phosphor materials and fluorescent lighting, solar cells and color displays utilizing nanosheet phosphors	2008-180826	2008 Jul 11
42	Nanosheet paint	2008-180828	2008 Jul 11
43	Photoresponsive drug delivery system (DDS) and drug-conjugated photoresponsive DDS	2008-184326	2008 Jul 15
44	Environment friendly Yellow pigment	2008-194346	2008 Jul 29
45	Co based Heusler alloy half-metal	2008-199712	2008 Aug 1
46	Current perpendicular to plan giant magnetoresistance device	2008-219619	2008 Apr 28
47	Age hardening magnesium Sn alloy	2008-243311	2008 Sep 22
48	Age hardening Magnesium Mg-Sn alloy	2008-243342	2008 Sep 22
49	Polymer brush-solid hybrid material and its manufacturing	2008-247361	2008 Sep 26
50	Graphene-coated materials and the fabrication method	2008-261875	2008 Oct 8
51	Prepregs having high thermal conductivities, process for production thereof and laminates	2008-269820	2008 Oct 20
52	Cage-type mesoporous silica (SNC-2): its synthetic method and application as adsorbents	2008-271929	2008 Oct 22
53	Mesoporous carbon (CNP-2) and its synthetic method	2008-272012	2008 Oct 22
54	Mesoporous carbon (MC-MCM-48) and its synthetic method	2008-274047	2008 Oct 24
55	Preparation of crystalline-oriented titania photoelectrodes	2008-288304	2008 Nov 11
56	Synthesis of semiconductor nanowires and fabrication of vertical-type field effect transistors using semiconductor nanowires	2008-296940	2008 Nov 20
57	ZnS/ZnO biaxial nanowires and their fabrication process	2008-297575	2008 Nov 21
58	Co based Heusler alloy and manetic device	2008-299551	2008 Nov 25
59	Calibration method of dopant impurities	2008-308073	2008 Dec 3
60	Organic field effect transistor	2008-321975	2008 Dec 18
61	A nanorod blend for liquid crystal display for polarization-tailored electro-optic devices	2008-322401	2008 Dec 18

List of International Patent Applications (October 2007 – December 2008):

No.	Name of Invention	Application Number	Date of Application
1	Dielectric devices and their fabrication methods	PCT/JP2007/074552	2007 Dec 20
2	Lead-free magneto-optical devices and their fabrication methods	PCT/JP2008/054656	2008 Mar 13
3	Mesoporous carbon nitride and its synthetic method	PCT/JP2008/056802	2008 Apr 4

4	Magnetio Film, Magnetio Recording/Reproducing Device, and Polarization Conversion Component	US Patent 12/135472	2008 Jun 9
5	Organic solvent dispersion of titania nanosheet and its film	PCT/JP2008/065989	2008 Sep 4
6	Fabrication method of sensor material for surface enhanced infrared absorption	PCT/JP2008/066107	2008 Sep 5

List of Japanese Patent Registrations (October 2007 – December 2008):

No.	Name of Invention	Registration Number	Date of Registration
1	Ga_2O_3 nanowires and their fabrication process	4025869	2007 Oct 19
2	Fabrication process of MgO nanocables and nanotubes	4025872	2007 Oct 19
3	Process for production of BN nanowires	4025873	2007 Oct 19
4	Fabrication process of GaN nanowires covered with gallium oxides	4025876	2007 Oct 19
5	Process for production of BN nanotubes included magnesium peroxides	4029158	2007 Oct 26
6	Manganese oxide nanosheet	4035599	2007 Nov 9
7	Layered cobalt oxide hydrate	4041883	2007 Nov 22
8	Electrochromic film	4051446	2007 Dec 14
9	Porous manganese oxide pillared with aluminum polyoxoions	4065953	2008 Jan 18
10	Single crystalline α-, β-Si_3N_4 nanoribbons and their fabrication process	4072622	2008 Feb 1
11	Lithium tantalate single crystal, its optical devices and growth method	4107365	2008 Apr 11
12	Photorefractive material	4139881	2008 Jun 20
13	Poling method of ferroelectric single crystals	4148451	2008 Jul 4
14	Shape control method of nanostructures	4192237	2008 Oct 3

List of International Patent Registrations (October 2007 – December 2008):

No.	Name of Invention	Registration Number	Date of Registration
1	Method of inverting polarization by controlling defect density or degree of order of lattice points, and optical wavelength conversion element	German Patent 602004014399.5-08	2008 Jun 11
2	Method of inverting polarization by controlling defect density or degree of order of lattice points, and optical wavelength conversion element	UK Patent 1684112	2008 Jun 11
3	Wavelength conversion element having multi-gratings and light generating apparatus using said element, and wavelength conversion element having cylindrical ferroelectric single crystals and light generating apparatus using said element	US Patent 7403327	2008 Jul 22
4	Method of inverting polarization by controlling defect density or degree of order of lattice points, and optical wavelength conversion element	US Patent 7446930	2008 Nov 4

Note: Additional MANA patents applications are not listed in this Appendix, because of privacy reason of the involved MANA researchers.

Appendix 8.9: Commendations

List of Commendations (October 2007 – December 2008):

Date	Prize	Prize Winner	Research for Commendation
2007 Oct	Poster Award at the Second International Symposium on Atomic Technologies	Shunsuke Tomita, Hiroyuki Hamada, Yukio Nagasaki, Kentaro Shiraki	Artificial chaperon system of amphiphilic polymer in combination with small additives to prevent protein aggregation
2007 Oct	Poster Award at the Second International Symposium on Atomic Technologies	Shogo Sumitani, Motoi Oishi, Yukio Nagasaki	Nanobiomaterials-design of pH-sensitive PEGylated nanogels containing fluorinated compounds as tumor-specific smart 19F MRI probes
2007 Nov 2	SSSJ Review Paper Award	Kazuya Terabe, Tsuyoshi Hasegawa, Tomonobu Nakayama, Masakazu Aono	Atomic switch-a nano device using motion of atoms and ions
2007 Nov 27	Days highlighted talk in MRS Fall Meeting 2007, Boston, USA	Somobrata Acharya	Ultra-thin Nanosheet Fabrication from Ultra-narrow PbS Nanowires
2007 Dec 1	Papers of Editors' Choice of Journal of the Physical Society of Japan	Shin Yaginuma, Katsumi Nagaoka Tadaaki Nagao Tomonobu Nakayama	Electronic structure of Ultrathin Bismuth Films with A7 and Black-Phosphorus-like Structures
2008 Jan	Best Poster Presentation Award at the Meeting of Special Postdoctoral Researchers Program, RIKEN, Japan	Satoshi Moriyama	Shell structures and spin configurations in carbon nanotube artificial atoms
2008 Jan	Best Cover Image Competition of the Year 2007, Journal: Materials Today	Pedro Costa, Dmitri Golberg, Guoshen Shen, Masanori Mitome, Yoshio Bando	"Solar Flares", an image of a CdS nanobelt deformed inside a transmission electron microscope
2008 Feb	Khwarizmi International Award by IRST Iran, Laureate of KIA	Ajayan Vinu	Multifunctional Nanoporous Materials
2008 Feb	Poster Award at the 18th Symposium of Materials Research Society of Japan	Toru Yoshitomi, Daisuke Miyamoto, Yukio Nagasaki	Synthesis of acetal-poly(ethyleneglycol)-b-poly(chloromethylstyrene) and application for functional bioimaging nanosphere
2008 Feb 19	Poster Award at WPI-AIMR & IFCAM Joint Workshop	Genki Yoshikawa	Evaluation of Sensitivity and Selectivity of Piezoresistive Cantilever-Array Sensors
2008 Mar	Poster Award at the First International Symposium on Interdisciplinary Materials Science	Shogo Sumitani, Motoi Oishi, Yukio Nagasaki	Preparation and Characterization of Tumor-Specific Imaging Probes Utilizing the pH-sensitive PEGylated Nanogels Containing 19F Compounds

2008 May 7	Asian Excellent Young researcher Lectureship Award 2008, Chemical Society of Japan	Ajayan Vinu	Discovery of Mesoporous Carbon Nitride (MCN), Boron Nitride and Boron carbon Nitride
2008 May 21	Best Poster Award at International Workshop on Nanomechanical Cantilever Sensors	Genki Yoshikawa	Evaluation of Sensitivity and Selectivity of Piezoresistive Cantilever-Array Sensors
2008 Jul	Award for Best Research by Young Scientist at International Conference on Carbon (Carbon 2008), Nagano, Japan	Pedro Costa, Yoshio Bando, Ujjal Gautam, Dmitri Golberg	Manipulating the current conductivity of halide-filled multi-walled carbon nanotubes
2008 Jul 9	Inoue Harushige Award of Japan Science and Technology Agency	Kenji Kitamura	Advancing Optical Technology by Controlling Single Crystal Defects
2008 July 16	2008 Tsukuba Prize	Takayoshi Sasaki, Minoru Osada	Synthesis of inorganic nanosheets and their organization into functional materials
2008 Aug 1	Best Oral Paper Award at IUMRS-ICEM 2008, Australia	Xiaosheng Fang, Yoshio Bando, Ujjal K. Gautam, Dmitri Golberg	1D ZnS Nanostructures: Controlled Growth and Field-emission Applications
2008 Sep 4	Fellow of the International Society of Electrochemistry	Kohei Uosaki	Scientific achievements within the field of electrochemistry
2008 Sep 14	Outstanding Research Award of Magnetic Society of Japan	Kazuhiro Hono	Excellent research on the microstructure-property relationships of magnetic materials
2008 Sep 25	SPSJ Hitachi Chemical Award	Masayoshi Higuchi	Discovery of electrochromic properties in organic-metallic hybrid Polymer and application to color electronic paper
2008 Oct 6	Fellow of the American Ceramic Society	Yoshio Bando	Studies of inorganic nanotubes
2008 Oct 6	5th Osawa Award of The Fullerenes and Nanotubes Research Society	Yasuhiro Shirai	Design, Synthesis, and Testing of Fullerene-wheeled Nanocars
2008 Nov 7	IWDTF Young Researcher Award	Jun Chen	Study on carrier transport in high-K gate dielectric
2008 Dec 1	MRS Best Poster Award at MRS Fall Meeting, Boston, USA	Naoki Fukata	Phosphorus Donors and Boron Acceptors in Silicon Nanowires Synthesized by Laser Ablation
2008 Dec 13	Award for Encouragement of Research in Materials Science at the IUMRS International Conference in Asia 2008	Alexei Belik	Effects of doping on structural, physical, and chemical properties of multiferroic $BiMnO_3$ and $BiCrO_3$
2008 Dec 13	Award for Encouragement of Research in Materials Science at the IUMRS International Conference in Asia 2008	Pavuluri Srinivasu, Ajayan Vinu	Pore-size control of mesoporous materials using high temperature microwave treatment

Appendix 8.10: International Cooperation

Cooperation under Memorandum of Understanding (MOU) Agreements:

List of MOU agreements of MANA with overseas institutions signed in 2008.

Organization	Country	Date of Agreement
Kent State University, Department of Chemistry	USA	2008 Jan 10
Rensselaer Polytechnic Institute, Chemistry and Biological Engineering	USA	2008 Feb 28
University of California Los Angeles (UCLA), The California NanoSystems Institute (CNSI)	USA	2008 Mar 24
Georgia Institute of Technology, Center for Nanostructure Characterization	USA	2008 May 6
CNRS (Centre d'elaboration de materiaux et d'etudes structurales)	France	2008 May 30
University of Cambridge, Nanoscience Centre	UK	2008 Jun 20
Indian Institute of Chemical Technology	India	2008 Jul 3
University of Basel, National Center of Competence for Nanoscale Science, Institute of Physics	Switzerland	2008 Jul 22
Yonsei University Korea	South Korea	2008 Sep 1
Indian Institute of Science Education and Research	India	2008 Dec 19

Joint Graduate School

The International Joint Graduate School Program is agreed with limited overseas universities. NIMS accepts full-time students registered in doctoral programs at the relevant graduate schools as NIMS junior researchers conducting research work under the guidance of NIMS researchers. The research work thus conducted is regarded by the relevant graduate school as part of the student`s academic career and the results may be included in their thesis. The agreement is signed by the President of NIMS. MANA joined this program and makes effort to develop it by accepting students from overseas.

NIMS Internship Program

The internship program is to provide domestic or overseas students in higher education with technical experience in the field of materials science and engineering, and also offer NIMS researchers well-qualified and motivated students. MANA joined this program.

Appendix 8.11: Media Coverage

List of Media Coverage of MANA (October 2007 – December 2008):

Date	Media	Description
2007 Dec	ACS Nano	A Conversation with Dr. Masakazu Aono: Leader in Atomic Scale Control and Nanomanipulation
2008 Apr 28 2008 May 2	World Times, Joyo Newspaper, Science News	Success in Development of Multi-Color Electronic Paper, using an organic/metal hybrid polymer
2008 Jun 27	Science News	Success in Fabrication of Mesoporous Metal with Giant Mesocage Structure
2008 Jul 2 2008 Jul 11	Nikkei News, Science News	Dr. Kitamura won the 2008 Inoue Harushige Prize for “Highly functional single crystals for optics grown by a method under defect control”
2008 Jul 11 2008 Jul 15 2008 Jul 22 2008 Jul 25 2008 Nov 22	The Chemical Daily, Joyo Newspaper, The Chemical Times, Nikkan Kogyo Shimbun, Science News, Asahi Shimbun	Success in Development of Novel Photocatalyst with High Activity in Visible Light
2008 Jul 16 2008 Oct 8	Nikkan Kogyo Shimbun, Mainichi Newspapers, Sankei Shimbun, Ibaraki Shimbun, Nikkei News, Joyo Newspaper	Dr. Sasaki and Dr. Osada won the 2008 Tsukuba Prize for “Synthesis of inorganic nanosheets and their organization into functional materials”
2008 Jul 17	Nikkei News	Introduction of PI Dr. Ye and the WPI program Title: Rapid rise of “NEW Chinese Abroad”
2008 Jul	Shikizai	Introduction of MANA as WPI program
2008 Sep 26	Denki Shimbun	Focus on the Sunlight basic research
2008 Dec	Physics Today	Japan aims to internationalize its science enterprise
2008 Dec 11	NHK (TV)	News: Good Morning, Japan Introduction of MANA as WPI program
2008 Dec 11 2008 Dec 12	Nikkan Kogyo Shimbun, Nikkei News	NIMS/MANA and Waseda University Faculty of Science and Engineering Concluded a “Joint Doctoral Program Agreement”

Appendix 8.12: Visitors at MANA

List of Visitors at MANA (April – December 2008):

Date (2008)	Name	Affiliation
Apr 10 - 11	Bruce Hamilton, Director	Georgia Institute of Technology, Center for Nanostructure Characterization (CNC), USA
May 1 - Jul 29	Lung-Ching Sang	Renssealaer Polytechnic Institute NY, Chemical Engineering, USA
May 13	Lim Chuan Poh, Chairman	SERC A*STAR, Singapore
	Chong Tow Chong, Executive Director	
	Yeo You Huan, Head, International Division	
	Tay Chor Shen, Senior Officer	
May 13 - 17	Hamid Garmestani, Leader of Laboratory	Georgia Institute of Technology, Laboratory of Micromechanics of Material (LMM), USA
May 14 - 17	Justin Schwartz	FAMU-FSU College of Engineering, Applied Superconductivity Center, National High Magnetic Field Laboratory, USA
May 12 - 17	Eric Beaugnon, Vice President, International Relations	Universite Joseph Fournier Grenoble, Presidential Team, France
May 12 - 17	Sophie Rivoirard	Universite Joseph Fournier Grenoble, France
May 13 - 17	Qiang Wang, Assistant Professor	Colorado State University, Department of Chemical Biological Engineering, USA
May 13	Prof. Niels F. Pedersen	Technical University of Denmark
May 19 - 20	T.P.D. Rajan	National Institute for Interdisciplinary Science and Technology, India, Materials and Minerals Division, India
May 26 - Aug 8	Alex Luce	University of Arizona, USA
	Courtney Bergstein	Carlow University, USA
May 27 - Jul 3	Prof. Enrico Traversa	University of Rome `Tor Vergata`, Italy, Department of Chemical Science and Technology, Italy
May 29	Dr. E. Sondergard	CRNS/Saint-Gobain, France
May 28 - Jun 26	S. B. Halligudi, Deputy Director	University of Pune, India, National Chemical Laboratory, India
Jun 1 - 30	A.Chandra Bose, Assistant Professor	National Institute of Technology Tiruchirappalli, Department of Physics, India
	Sirvan Velmathi	Indian Insitute of Technology, Department of Chemistry, India
Jun 2 - Aug 27	Vinila Bedekar	The University of Texas at Arlington, Department of Materials Science and Engineering, USA
Jun 3 - Aug 26	Jonathan King	Brigham Young University, USA
Jun 5	Jacques Bonvoisin	CEMES/CNRS, NanoSciences Group, France
Jun 9 - Aug 14	Corey Kubber	Massachusets Institute of Technology, USA
Jul 1 - 5	Yuval Golan, Associate Professor	Ben Gurion University of the Negev, Israel, Department of Materials Engineering, Israel
Jul 2 - 7	Prof. K.V.R. Chary	Tata Institute of Fundamental Research, India, Department of Chemical Sciences, India
	M. Lakshmi Kantam, Dept. Director and Head	Indian Institute of Chemical Technology, India

Jul 7 - 8	Christine Luscombe, Assistant Professor	University of Washington, Seattle, Materials Science and Engineering Department, USA
Jul 16	Dr. Nick Teerachai Pornsin-Sirirak, Deputy Executive Director	National Nanotechnology Center (NANOTEC), NSTDA, Thailand
Jul 16 - 18	Prof. Alexander Niemark	The State University of New Jersey, Deptartment of Chemical and Biochemical Engineering Rutgers, USA
Jul 17 - Oct 09	Andrea Seehuber	University of Heidelberg, Department of Applied Physical Chemistry, Germany
Jul 19 - 20	Prof. Harry Kroto	The Florida State University, Department of Chemistry and Biochemistry, USA
Jul 19	Toru Maekawa, Director	Toyo University, Bio-Nano Electronics Research Center, Japan
Jul 24	Dr. Dedi Mulyadi, Head of R&D Agency	Ministry of Industry, Republic of Indonesia
	Dr. Abu Hanifah	
	Setiono MA, R&D Director	
	Catur S	
	Achmad Sigit Dwiwahjono, Industrial Attache	Embassy of Republic Indonesia, Tokyo
Jul 27 - Aug 22	Prof. J.Gimzewski	UCLA, California Nano Systems Institute, USA
Jul 27 - Aug 6	Tuanvu Lee	UCLA, CNSI, USA
Jul 27 - Aug 2	Simon Attwood	University of Cambridge, IRC, UK
	Dr. James Bendall	
	Alexander Buell	
	Crystal Cheng	
	Yachin Ivry	
	Mathias Kolle	
	Yun-Thai Li	
	Angel Tsu-Hui Lin	
	Tomas Oppenheim	
	Joanna Slota	
	Swee-Ching Tan	
Aug 3 - 18	Greg Pawin	UCLA, Chemistry and Biochemistry Department, USA
Jul 27 - Sep 7	Carlin Hsueh	
Jul 27 - Aug 31	Haider Rasool	
Jul 27 - Sep 14	Adam Stieg, Scientific Director	UCLA, California Nano Systems Institute, USA
Jul 28 - Aug 5	Prof. Enrico Traversa	University of Rome `Tor Vergata`, Italy, Department of Chemical Science and Technology, Italy
Jul 28 - Aug 6	Dr. Emilliana Fabbri	
	Dr. Daniele Pergolesi	
Aug 3 - 31	Audrius Avizienis	UCLA, Chemistry and Biochemistry Department, USA
Aug 26 - Nov 22	Subba Reddy	Indian Institute of Chemical Technology, India
Aug 26 - 27	Tulsi Mukherjee, Director	Bhabha Atomic Research Centre, Mumbai, India
Aug 30 - Sep 2	Eunkyoung Kim, Director	Yonsei University, Laboratory of Organic Materials for Information Processing, Korea
Aug 30 - Sep 2	Cheolmin Park, Associate Professor	Yonsei University, Department of Metallurgical System Engineering, Korea
Aug 27 - Sep 06	Seogjae Seo	Yonsei University, Korea
Sep 1 - Nov 30	Christopher Ochs	University of Melbourne, Department of Chemical and Biomolecular Engineering, Nanostructures Interfaces & Materials Group, Australia
Sep 2 - 5	Mark Elsegood, Ph. D.	Loughborough University, UK, Department of Chemistry, UK

Nov 10 – Jul 2009	Hamid Oveisi	Iran University of Science and Technology (IUST), Department of Metallurgy and Materials Engineering, Iran
Sep 5 - 6	Prof. Harry Anderson	University of Oxford, Department of Chemistry, Chemistry Research Laboratory, UK
Sep 4 - 11	Prof. Marc-Olivier Coppens	Rensselaer Polytechnic Institute, Chemical & Biological Engineering, USA
Sep 9	Prof. Jean-Pierre Sauvage	University Louis Pasteur, France
Sep 16	Dr. Kenneth M. Beck	Pacific Northwest National Laboratory, USA
Sep 19	Prof. Ivan Astadal	Charles University, Czech Republic
Sep 26	Shankar Narayanan Ekkanath Madathil, Rolls-Royce/Royal Academy of Engineering Research Chair	University of Sheffield, Electronic and Electrical Engineering Department, UK
Oct 5 - 19	Prashant Gupta	Indian Institute of Technology Kanpur, India
Oct 9	Prof. Arthur J. Carty	Univ. Waterloo Canada, Canada
	Dr. G.Mark Scullion, Science Counselor	Embassy of Canada
	Leslie Gill, Trade Commissioner	
Oct 14	Chin-Kun Hu, Research Fellow	Academia Sinica, Institute of Physics, Taiwan, Laboratory of Statistical and Computational Physics, Taiwan
Oct 15	Prof. Eberhard Umbach, Chairman of Executive Board	FZK, Germany
	Dr. Olaf Wollersheim, Administrative Director	
Oct 17	Prof. Leong-Chuan Kwek	National University of Singapore, Singapore
	Prof. Dean A. Zollman	Kansas State University, USA
	Dr. Kennedy J. Reed	Lawrence Livermore National Laboratories, USA
	Prof. Gerd Ulrich Nienhaus	University of Ulm, Germany
	Prof. Bruce D. Gaulin	McMaster University, Canada
	Dr. Undraa Agvaanluvsan	Stanford University, USA
	Prof. E Dan Dahlberg	University of Minnesota, USA
	Dr. Bernhard H. Nunner	German Physical Society, Germany
	Dr. Irvy (Igle) Gledhill	CSIR, South Africa
	Prof. Ze Zhang	Beijing University of Technology, China
	Dr. Robert Tchitnga	Cameroon Society of Physics, Cameroon
	Prof. Kenichi Ueda	University of Electro-Communications, Japan
	Dr. El-Hachemi Amara	Advanced Technologies, Algeria
	Dr. Deependra Das Mulmi	Yokohama Electron Pvt. Ltd., Japan
Oct 17 - 25	Enge Wang, Vice Secretaries-General	Chinese Academy of Sciences (CAS), China
Oct 20	Prof. Peter T. Cummings	Vanderbilt Univ. PS in CNMS, ORNL, Chem.Engineering, USA
Oct 22	Prof. John Corish	Trinity College, University of Dublin, School of Chem., Ireland
	Yoshihisa Ohashi	Irish representative in Japan FAS Japan
Oct 20 - 22	Zhong Lin Wang, Director	Georgia Institute of Technology, Center for Nanostructure Characterization (CNC), Georgia Tech, USA
Oct 19 - 25	Prof. Enrico Traversa	University of Rome `Tor Vergata`, Italy, Department of Chemical Science and Technology, Italy
Oct 20 - 31	Dr. Emilliana Fabbri	
Oct 17 - 23	Wolfgang Shmitt	Trinity College Dublin, School of Chemistry, Inorganic Materials Chemistry Research Group, Ireland

Oct 23	Prof. Victor Lin	Iowa State University, Department of Chemistry, College of Liberal Arts and Science, USA
Oct 19 - Nov 1	Prof. David E. Laughlin	Carnegie-Mellon University, Department of Materials Science and Engineering, USA
Oct 26 - 28	Prof. Oliver Gutfleisch	IFW Dresden, Institute for Metallic Materials, Functional Magnetic Materials and Hydrides, Germany
	Dr. Thomas Woodcock	IFW Dresden, Germany
	Prof. Thomas Schrefl	University of Sheffield, Department of Engineering Materials, UK
	Dr. Gino Hrkac	
Oct 28	Hanjo Lim, Prof., President of KNTRS	Graduate school of Anjou University, Korea
Oct 31	Prof. Hideaki Takayanagi	Tokyo Institute of Technology, Department of Physics, Japan
Nov 4	Chen Jun, Rector	Nanjing University, China
Nov 4	Prof. Zou Zhigang	
Nov 4	Zou Yajun, Head International Affairs Office	
Nov 4	Prof. Zhu Anxin	
Nov 13	Jiri Malek, Rector	University of Pardubice, Czech Republic
Nov 13	Prof. Tomas Wagner	
Nov 10	Emilia Mendez, Director	Brookhaven National Lab., Center for Functional Nanomaterials, USA
Nov 14	Eric J. Amis, Dr., Deputy Director	National Institute of Standards and Technogoly, United States Department of Commerce, USA
Nov 14	Prof. Richard Berndt	University of Kiel, Institute of Experimental and Applied Physics, Germany
Nov 15 - Feb 12 2009	Rajashree Chakravarti	IICT (Indian Institute for Chemical Technology), Inorganic and Physical Chemistry Division, India
Nov 25	Prof. Krzysztof J. Kurzydlowski, Vice-president of the Council of Science	Warsaw University of Tech., Materials Science and Engineering, Poland
Nov 28	István Bársony, Director Administration	Research Institute for Technical Physics and Materials Science, Hungary
Nov 28	Prof. György Mihaly	Budapest Univ. of Tech. and Economics, Solid State Physics Laboratory, Hungary
Nov 28	Adnan Akay, Director, Division of Civil	NSF, CMMI, ENG, USA
Nov26 - 28	Prof. Zhong Lin Wang, MANA Satellite PI	Georgia Institute of Technology, Center for Nanostructure Characterization (CNC), Georgia Tech, USA
Nov 26 - 29	Christian Joachim, MANA Satellite PI	Centre National de la Recherche Scientifique, CEMS laboratory, France
Dec 1	Oliver Groening	Swiss Federal Laboratories for Materials Testing and Research, Switzerland
Dec 11	John A. Dagata	National Institute of Standards & Technology, Engineering Division, USA
Dec 11	Goran Karapetrov	Argonne National Laboratory, Materials Science Division, USA
Dec 12 - 21	A. Ajayaghosh, Adjunct Professor	Nat. Inst. Interdisciplinary Sci.&Tech., India, Chemical Science and Technology Division, India
Dec 7 - 18	Prof. Mietek Jaroniec	Kent State University, Department of Chemistry, USA
Dec 15	Thomas A. Jung, Head of Lab.	Paul Scherrer Institute, Molecular Nanoscience Laboratory for Micro-and Nanotechnology, Switzerland
Dec 18 - 19	Prof. Robert L.Snyder, Chair	Georgia Institute of Technology, School of Materials and Engineering, USA

Appendix 8.13: MANA History with Photos

MANA History (October 2007 – February 2009):

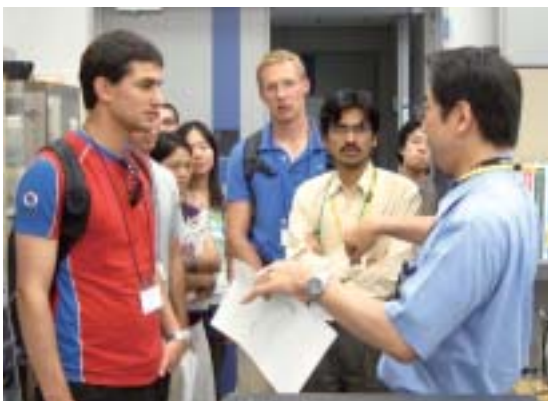
Date	Event
2007 Oct 1	Official inauguration of MANA
2007 Oct 18	MANA opening ceremony (at Okura Frontier Hotel Tsukuba)
2008 Mar 10-13	The First MANA International Symposium
2008 Mar 24	MANA signed a MOU with UCLA, USA
2008 Apr 1	ICYS-MANA started
2008 Apr 16	First on-site visit by WPI working group
2008 May 6	MANA signed a MOU with the Georgia Institute of Technology, USA
2008 May 20	First Follow-up Meeting
2008 May 30	MANA signed a MOU with the CNRS, France
2008 Jun 2	NIMS Overseas Operation Office opened at the University of Washington, USA
2008 Jun 20	MANA signed a MOU with the University of Cambridge, UK
2008 Jul 19	Prof. Sir Harry W. Kroto visited MANA
2008 Jul 28 – Aug 1	Fifth NIMS-IRC-UCLA Nanotechnology Summer School held at NIMS
2008 Oct 1	Celebration of first anniversary of MANA. Organizational reform of MANA
2008 Nov 27-28	Second on-site visit by WPI working group
2009 Feb 25-27	The Second MANA International Symposium

Photos of MANA Events:

MANA opening ceremony at Okura Frontier Hotel Tsukuba (Oct 18, 2007)


The First MANA International Symposium (Mar 10-13, 2008)


Visit of Prof. Harry Kroto, Nobel Prize Laureate (Jul 19, 2008)




The Fifth NIMS/MANA-IRC-UCLA/CNSI Nanotechnology Students Summer School in Tsukuba (Jul 28 - Aug 1, 2008)


Site visit of WPI Working Group (Nov 27-28, 2008)


The Second MANA International Symposium (Feb 25-27 2009).
Presentations of the WPI Program Chairperson Prof. Hiroo Imura (left) and the WPI Program Director Prof. Toshio Kuroki (right).


The Second MANA International Symposium (Feb 25-27 2009).
Presentations of the MANA Advisor Prof. Heinrich Rohrer (left) and the MANA Evaluation Committee Chairman Prof. Anthony K. Cheetham (right).

Appendix 8.14: Comments of MANA Evaluation Committee

MANA Evaluation Meeting, March 12, 2008
Key Points arising from the Discussion

The committee meeting notes covered all the issues that were discussed, but the following is a list of the most important issues that the MANA management needs to address:

1. The management of the Satellite Institutions is likely to be a challenge. I would recommend that MANA should set clear expectations in terms of the level of engagement and commitment from the satellites. If the Satellites fail to meet the agreed expectations, then the MANA management would have the option of withdrawing the funding.

2. A Satellite Partner should be sought in Asia in order to make MANA truly global. Obvious possibilities include IMRE (Singapore), JNCASR (Bangalore), KAIST (Taejon) and the CAS Institute of Physics in Beijing. I would be happy to help with any of these links.

3. The link between the MANA technical programs and goal of “Sustainable Development” needs to be articulated more clearly. At present, the connection between the projects and this larger goal is rather vague. It is possible that the larger goal will become a liability of this issue is not addressed at an early stage.

4. It would clearly make a huge difference if one or two senior PIs could be attracted from overseas. Viable options would include (i) attracting Europeans who are approaching retirement but are still very active (Harry Kroto moved to Florida for this reason), (ii) attracting well-established Indian, Chinese, Korean or Taiwanese scientists from the States, (iii) seeking people who have established a strong link with Japan, e.g. they might have done post-docs or sabbaticals there in the past.

5. It is very important that the new MANA centre should be branded. In order to do this quickly and effectively, the use of the acronym ICYS will have to be discontinued. At present, there is some confusion between MANA and ICYS in the eyes of the outside world.

6. Links with industry need to be built up pro-actively. Maybe an annual workshop with industry would be useful, as well as the involvement of more engineers?

Anthony K. Cheetham
May 5, 2008

Appendix 8.15: Comments of WPI Program Committee

World Premier International Research Center (WPI) Initiative
General Comments on FY2007 WPI Project Progress
by Program Committee
(June 2008)

WPI Research Centers

In October 2007, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) selected five research center projects to be funded under the WPI Program. They are as follows:

- Advanced Institute for Materials Research (AIMR), Tohoku University
- Institute for the Physics and Mathematics of the Universe (IPMU), The University of Tokyo
- Institute for Integrated Cell-Material Sciences (iCeMS), Kyoto University
- Immunology Frontier Research Center (IFReC), Osaka University
- International Center for Materials and Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS)

Purpose of program

To enhance the level of science and technology in Japan and continuously trigger innovation that serves as an engine for future growth, it will be necessary to boost the nation`s basic research capabilities while strengthening its global competitiveness. To this end, Japan needs to create research centers in which world`s finest brains gather, outstanding research results are generated, and talented young researchers are fostered. These centers should be highly innovative in both their concepts and practices, unfettered by conventional thinking.

Site visits and Follow-up Committee

Site visits were conducted on April 2008 under the concept that the project members` startup efforts should reflect an understanding of the WPI Program`s principles and objectives, which is of particular importance to successfully implementing these highly challenging, long-term initiatives.

Following the site visits, the WPI Follow-up Committee was convened on May 20, 2008 in Tokyo to assess the initial implementation statuses of the WPI research center projects. The following are the main points which were discussed in the committee.

1. Globally visible centers

Each of the WPI research centers is conducting a very high level of research in their respective research areas. Exemplifying this are Dr. S. Akira, Director of IFReC, whose papers have been ranked "world most-cited", and Dr. S. Yamanaka, Principle Investigator (PI) of iCeMS, whose discovery of iPS cells was ranked second as a "Breakthrough of the year 2007" by *Science*.

Scientific evaluations of each project will be conducted from FY 2008 by working group members, who were appointed by Program Committee this year. Each working group comprises about 5-6 specialists in the subject field, half of whom as a rule be overseas members.

Besides a high quality of scientific research, other conditions are also required of the WPI research centers. WPI projects are not mere vehicles for distributing large amounts of research funding; their aim is to create genuine top world-level research centers in Japan. WPI research centers are expected to be globally visible – highly appraised and reputed by world-leading experts and viewed by young investigators as a proud step in advancing their carrier paths. To this end, it is essential for the centers to achieve a global presence with which they can attract the world`s top-level researchers.

Participation of top-level principal investigators (PIs) from around the world is an essential requisite for WPI research centers. For this purpose, the following target numbers were called for in the program application guidelines.

- At least 10-20 world-class PIs, at least 10-20% of whom are to be foreign researchers invited from abroad.
- At least 30% of the researchers to be from overseas, including those on short stays.
- A total of at least 200 staff members as a target, including young postdoctoral researchers, research support staffs, and administrative employees.

All WPI research centers have invited overseas PIs; however, their numbers and overall quality fall short of meeting the goal of creating a critical mass at this point. The centers are still searching for world-class PIs, which, not being an easy task, may in some cases take another few years. Considering the 10 year-term of the WPI Program, they should be more aggressive about inviting excellent young researchers with high future potential.

On the other hand, some apprehension was voiced by members of the Follow-up Committee with regard to over fettering the centers with numerical staffing quotas.

Some of the Japanese PIs continue to hold concurrent positions in their previous faculties. Not having freed themselves from teaching and administrative obligations, their ability to contribute to the WPI research center may be limited.

All five WPI centers launched their projects by holding an international symposium, via which they established within the global scientific community the presence of their WPI research projects.

The success of the WPI research projects will be dependent greatly upon the performance, in both areas of research and administration, of the center directors. Full-fledged support by host institutions and staff members will be indispensable so as not to exhaust the directors before achieving the goals of their WPI projects. At the same time, the bureaucratic burden placed on management, e.g. heavy volume of documents, should be kept to a minimum.

2. Research fields

The WPI Program operates on a principle of interdisciplinary research that can be expected to create breakthroughs or paradigm shifts in existing research disciplines. The Following-up Committee discussed the proposed research plans, their implementations and prospects. They are as follows: IPMU is fusing mathematics and physics in seeking an understanding of the origin of the universe. AIMR and MANA are working to fuse research areas that already exist in their host institutions, while iCeMS is conducting research characterized by meso-space. IFReC is applying molecular imaging techniques to immunology.

For encouraging such fusion, it is important to provide an opportunity to communicate freely among those in diverse research fields and with diverse interests. IPMU`s director has arranged an `afternoon tea time` to which all members are asked to join. In the new IPMU building, a space for communication is planned. In some other WPI centers, however, little or no communication among the young researchers was observed.

As these projects are in rapidly advancing interdisciplinary fields, both their research directions and strategies need to undergo frequent review while more effort needs to be made to fuse their diverse research fields. Each WPI center should consider what concrete measures it will need to take to realize this fusion.

3. Research environments

Research infrastructure, e.g. buildings, space administrative and technical support, is essential to achieving the objectives of the WPI Program. All of the WPI research centers are in the process of moving to new facilities where the PIs can work together, thus facilitating, as mentioned above, communication and stimulating interdisciplinary collaboration among them. For this purpose, host institutions are investing large amounts of money.

The new building for IPMU will be completed next year. New facilities for IFReC and AIMR are under construction on the site of their original institutes. Offices for the PIs of MANA will be in a same building, though their experimental facilities are located separately on three campuses.

iCeMS plans to have three buildings, one of which will be used exclusively for CiRA (Center for induced pluripotent stem cell Research and Application). The Follow-up Committee indicated a need for a clearly defined relationship between iCeMS and CiRA.

At present as in the past, Japan`s administration systems are carried out exclusively in the Japanese language, while administration people are generally not trained in English. The WPI Program, however, expects institutions to establish English as the primary language for work-related communication. All the WPI research centers are successfully making this change in their administrations by hiring English-speaking persons. Furthermore, four of the centers have employed persons with research experience as the head of their administrative office. Language support is being well arranged at MANA, where all information is provided bilingually. Grant applications are translated into Japanese by its administrative staff in cases when the grant program accepts applications in Japanese only. The establishment of this bilingual system is in large part aided by NIMS`s previous experience with the MEXT-grant ICYS (International Center for Young Scientists). In fact, 35% of MANA researchers are from overseas. IPMU is also exerting an all-out effort to invite and accept foreign researchers.

4. Administration

Establishing new administration systems is another mandated task of the WPI Program. Existing university administrative procedures and other bureaucratic obstacles need to be overcome. Newly implemented systems are expected to be more flexible and to include such components as strong leadership by the directors, top-down decision-making and merit-based pay schemes. Good examples of progress in this direction are by Dr. H. Murayama, IPMU Director, who is working to create a streamlined administrative system for the center differing from that of the host institution, and AIMR which is establishing a strong top-down leadership system for the center managed by its four core members. Most of the centers have either adopted or plan to adopt merit-based incentive or payment schemes.

The host institutions place the WPI project within their most high-priority strategic initiatives. They are providing the research centers with strong financial support.

As a unique case, while being the president of Tohoku University, Dr. A. Inoue works as a PI, dedicating 30% of his time, in AIMR.

5. Fostering young scientists

As clearly stated in the application guidelines, it will be an important task to foster and train young investigators as the successors of these 10-years projects. While the WPI centers are to create an environment in which scientists can concentrate on their research, the program does not exclude students from joining the projects. Working with top-notch researchers will have a positive impact on young scientists, including graduate students. Host institutions need to facilitate the creation of close partnerships between their WPI centers and graduate schools. Being a non-university institution, it is of particular importance for MANA to establish good connections with universities in fostering young manpower and research vitality.

Postdoc positions are internationally recruited, for which a large number of applications have been sent out. However, finding and hiring outstanding postdoctoral researchers is not necessarily easy. MANA adopts a double-mentor, double-affiliation, double-discipline system for young scientists. IPMU encourages its postdocs to do research at overseas institutes for a certain period of time each year.

6. Conclusions

All five WPI centers are undoubtedly operating at a very high level in their respective research fields and have great potential to be world top-level institutes in the future. Although some improvements are still needed, these WPI centers have made every effort in establishing themselves as top-level research centers during this 6-month period. We look forward with great anticipation to their future efforts to attract top researchers from both at home and abroad as they strive to create genuine top world-level research centers in Japan.

Among five WPI centers, we are particularly impressed with the activities of iCeMS and IPMU. iCeMS has attracted world-wide attention with the discovery of iPS cells by its PI, Dr. S. Yamanaka, which marked a major step forward in creating a globally visible research center, a primary aim of the WPI Program. IPMU is working to establish an entirely new institute under the strong leadership of its director, Dr. H. Murayama. The challenge undertaken by this group is truly remarkable as it promises to create a model that can be emulated by other WPI centers.

For detailed comments on the progress of each WPI center, please see the reports prepared for each of them.

World Premier International Research Center (WPI) Initiative
Comments on FY2007 WPI Project Progress
by Program Committee
(June 2008)

Host Institution:	National Institute for Materials Science (NIMS)
Host Institution Head:	Teruo Kishi
Research Center:	International Center for Materials Nanoarchitectonics (MANA)
Center Director:	Masakazu Aono

1. Status of overall progress

Research Organization, Management, Training System

The International Center for Materials Nanoarchitectonics (MANA) has gotten off to a good start against a background of previous activities under NIMS`s Nanotechnology Support Network and International Center for Young Scientists (ICYS) project. The Network has served to form the infrastructure for the center`s R&D activities by providing support systems such as nanotechnology foundry with world-class research instruments and facilities and a well-established international administrative support system. ICYS has provided the foundations for recruiting and employing overseas researchers, particularly young scientists, through a 3D (double-mentor, double-affiliation, and double-discipline) system. Many senior and young researchers from abroad have joined MANA (60 foreigners out of 170 members), reflecting its excellent international support system. As of March 31, MANA has 22 PIs (15 Japanese and 7 foreigners): 15 from NIMS (12 Japanese and 3 foreigners) and 7 from satellites, comprising two Japanese universities and three universities and one institute in the US and Europe. It also has 11 young scientists (9 Japanese and 2 foreigners) and 37 postdoctoral fellows, 81% of whom are foreigners. As a whole, MANA has an excellent framework of international collaboration. Furthermore, MANA is well organized under the governance and management of the Center Director and Host Institution Head.

MANA should continue experimenting with innovative organizational reforms while exploring future-oriented ideas and long-term possibilities and focusing on research milestones that will add a time dimension to its research agenda. Such will be essential for it to maintain the excellent structure of its organization and become a genuinely original WPI research center, capable of attracting researchers from around the world. The key to achieving this will be to recruit international and world-class PIs and young researchers as well as to focus on integrated research base on the new concept "nanoarchitectonics".

2. Points that need improvement

WPI Laboratory

MANA has modified its initial plan and made a decision to integrate the offices of its PIs into one building. This is a major step forward to realizing a "visible" research center, and MANA`s decision to do is praiseworthy. Therefore, when the facility will be completed should be clearly stated. It is desirable that it should be introduced at an early stage as a place for continually renewing the WPI organization, generating new ideas on future innovation, integrating the five MANA research groups, and facilitating interaction and collaboration.

Research organization

In advancing nanoarchitectonics, the establishment and operation of the four technical groups is desirable. However, if each group conducts investigations in only its own field, it will be difficult to make breakthroughs in nanotechnology. The integration of both researchers and research contents will be essential. For MANA to become a world-leading nanoscience research center, each of its groups should recruit top world researchers, while considering the possibility of rotating members among the groups. In this respect, some fields should be strengthened, particularly the fields of *ab initio* and multi-scale computational simulations, computational nano-materials and device design, and mesoscopic theoretical chemistry, which complement the research in MANA`s four technical groups. Unifying or integrating the key technologies should be aggressively challenged. Exchange of researchers also needs to be promoted between MANA and universities.

Research Satellites

Collaboration with satellites by merely providing research funding does not constitute an effective cooperative relationship. MANA should develop concrete joint projects or other mechanisms that involve the satellites in its activities. **1) Overseas:** The abilities of excellent foreign PIs should be effectively used by designing attractive programs for them. Since MANA is located in the Tsukuba area, which is not easily accessible for young students, it will be important to hold international workshops on nanoarchitectonics at universities and institutions in Japan, through which MANA can be advertised and excellent young researchers recruited. **2) Domestic:** The Nano-Science and Technology Project is being carried out in the Nanotechnology Research Institute of the National Institute of Advanced Industrial Science and Technology (AIST) in Tsukuba with a staffing scale comparable to MANA`s. Though AIST has a competitive relationship with MANA, it will be important to build a cooperative partnership with it to advance R&D in this field. Both organizations are supported by the Japanese government, but have different missions within the nanotechnology domain. Nevertheless, greater prospects for future outcomes can be expected through collaboration, rather than competition. Interchange among researchers of the two organizations should be encouraged through joint seminars and other activities.

3. Others

In addition, the following are some opinions expressed by the program committee members.

1. An aggressive challenge should be made to unify and integrate the key technologies with an eye to pioneering the next generation of innovative nano-materials and nano-sciences. To make the institute a globally attractive WPI center, it will be essential to set original research goals with impactful ripple effects and to seek highly creative research results, even if the number of researchers is limited. It would be desirable to have a committee to discuss the future prospects and directions of nanotech devices and systems.
2. For a research institute that is not a university, it is particularly important to develop channels through which to bring in new, fresh ideas and points of view. The existing young scientist program is good, but it is not clear whether it provides young scientists with sufficient freedom to try new things. The research agenda may be set too much from a top-down perspective.
3. The relationship between MANA and NIMS is a bit unclear. A clear differentiation should be made between the two organizations. If MANA does not maintain a distinct identity, it is feared that its project will be seen as buried among NIMS` other projects. It is no clear how MANA`s approach to facilitate collaboration differs from what is already being used in NIMS. MANA needs to declare how it intends to deliver on its goals and ambitions with respect to management style, autonomy and freedom, and other operational aspects.
4. MANA people should be aware that they are paving a new way for other independent administration research institutions. They should take the lead in making changes and addressing challenges relative to other governmental research organizations as well.

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