Activities in Nanotechnology Researchers Network

1. **Role of Nanotechnology Researchers Network Center**
2. **Activities in Nanotechnology Researchers Network Center**

http://www.nanonet.go.jp/

The Science and Technology Basic Plan (2001-2005)

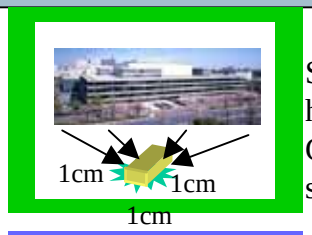
Council for Science and Technology Policy (CSTP)

- **Strategic Priorities in R & D**
  1. **Promotion of basic researches**
  2. **Prioritized funding**
     - **(1) Life science**
     - **(2) Information and communication technology**
     - **(3) Environmental science**
     - **(4) Nanotechnology and materials**

Priority Fields of Nanotechnology & Materials

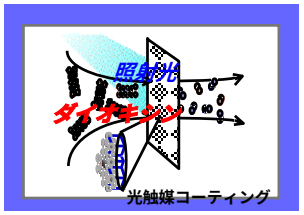
By Council of Science and Technology Policy Sep. 21, 2001

○Nano-devices & materials for the Next Generation Communication System



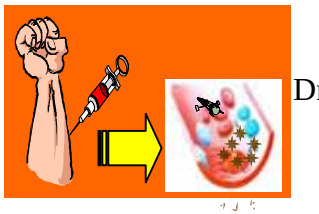
Storing all the information housed at the Library of Congress into a device the size of a sugar cube.

○ Materials for Environment & Energy-saving



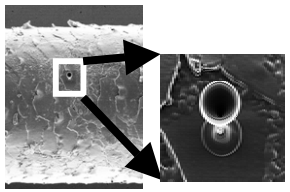
Nanostructure-controlled Catalysis

○ Nano-biology for Novel Medical Care Technology & Biomaterials



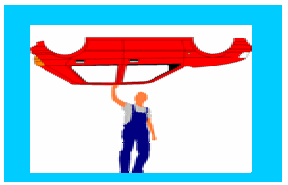
Drug Delivery System

○ Underlying Technologies such as Fabrications, Analyses, Simulations, etc.



Nano-wineglass on a hair.

○ Novel Materials with Innovative Functions



Materials with ten times the strength of steel and only a small fraction of the weight

Nanotechnology & Materials Science Budget In Japan

Funding by Agency (**data from the CSTP and the MEXT)** **(million dollars)**

	FY2001	FY2002	FY2002 Suppl. Budget	FY2003
MEXT	329	547	143	548
METI	167	351	42	401
Others	7	40	0	42
TOTAL	503	938	185	991

*** These numbers in this table include competitive funds and so on, which have not yet been distributed. Therefore, these numbers in each cell is estimated by statistical data and other data.**

**** $1 = ¥120**

* Others:

MPHPT (Ministry of Public management, Home affairs, Posts and Telecommunications)

MAFF (Ministry of Agriculture, Forestry, and Fisheries)

MHLW (Ministry of Health, Labor and Welfare)

4. Nanotechnology Research Fund in Japan

Curiosity Drive

MEXT, JSPS

20 to 25 Billion yen

Basic Research
(Competitive Funding / Bottom-up Funding)

Initiative

Public Research Institutes
NIMS, RIKEN

10 to 12 Billion yen

Generic Technology

Initiative (Virtual Lab)

JST

5 to 10 Billion yen

Basic - Application
(10 to 20 Years for Application)

National Initiative (Flagship-type)

METI, NEDO, AIST

30 to 35 Billion yen

Application and Practical Use
(Top-down Funding, 5 to 10 Years)

JST Virtual Labo by Nanotechnology Area

Strategy Target	Research Area	
Creation of nanodevice / material / system for overcoming integration / function limits in data processing and communications	**[Construction of Super High-Speed, Super Power-Saving, High-Performance Nanodevice System] Hiroyuki Sakaki**, The University of Tokyo	Sukekatsu Ushioda, (Tohoku University **[Creation of Innovative Technologies by Fusion of Data, Bio, Environmental and Nano Technologies]**
	[Creation of Nanodevice System Based on New Physical Phenomenon and Operation Principles] Koji Kajimura, Japan Society for the Promotion of Machine Industry	
	[Nano Factory and Process Monitoring for Realizing Advanced Data Processing and Communication] Kenji Gamo, Osaka University	
	[Use and Control of Nano Structure Materials for Realizing Advanced Data Processing and Communications] Hidetoshi Fukuyama, The University of Tokyo	
Creation of functional materials / system that utilize nano biotechnology for realizing a noninvasive medical treatment system	**[Creation of Bio Device / System that Uses Chemical / Biosystem Molecules for Medical Treatment] Masuo Aizawa**, Tokyo Institute of Technology	
	[Construction and Use of Hyperfunctional Structure such as a Soft Nano Machine] Hirokazu Hotani, Nagoya University	
	[Creation of Functional Material / System by Molecular Orientation Control of Self-organizing for Medical Treatment] Koji Kaya, Okazaki National Research Institutes	
Creation of nano materials / system for realizing environmental conservation and advanced energy recycling to minimize stress on the environment	**[Creation of Nano Structure Control Catalyst and New Material for Environmental Conservation] Makoto Misono**, Kogakuin University	
	[Creation of Nano Structure Materials / System for Advanced Use of Energy] Akira Fujishima, The University of Tokyo	

Nanotechnology Research Projects by METI / NEDO

	Project name	Representative
Nanotechnology Program (Nanomaterials and Processing Sub-Program)	"Nanotechnology Glass"	**Kazuyuki Hirao** (Graduate School of Engineering, Kyoto University)
	"Nanotechnology Metal"	**Akihisa Inoue** (Institute for Materials Research, Tohoku University)
	"Nanotechnology Particle"	**Kikuo Okuyama** (Graduate School of Engineering, Hiroshima University)
	"Nanostructure Coating"	**Toyonobu Yoshida** (Graduate School of Engineering, Faculty of Engineering, The University of Tokyo)
	"Synthetic Nano-Function Materials"	**Hiroshi Yokoyama** (Nanotechnology Research Institute, National Institute of Advanced Industrial Science and Technology)
	"Nanotechnology Material Metrology"	**Mitsuru Tanaka** (Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology)
	"Nanostructure Polymer"	**Seiichi Nakahama** (Research Center of Macromolecular Technology, National Institute of Advanced Industrial Science and Technology)
	"Systematization of Nanotechnology Materials Program Results"	**Hiroshi Komiyama** (Graduate School of Engineering, The University of Tokyo)
	"Nanocarbon Technology"	**Sumio Iijima** (Research Center for Advanced Carbon Materials, National Institute of Advanced Industrial Science and Technology (AIST))
MIRAI Project	"Millennium Research for Advanced Information Technology"	**Masataka Hirose** (Advanced Semiconductor Research Center, National Institute of Advanced Industrial Science and Technology (AIST))

Nanotechnology Research Institutes in Japan (excl. Commercial Institutes)

IU	Inter-University Research Institutes
IN	Institutes of National Universities
RC	Research Centers of National University
IA	Independent Administrative Institutes / Special Corporations

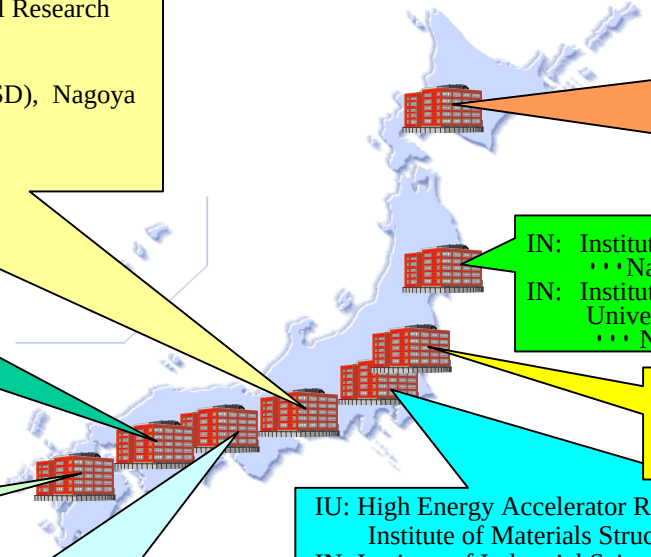
IU: Institute for Molecular Science, Okazaki National Research Institutes
・・・ Molecule structures and functions
IU: National Institute for Physiological Sciences, Okazaki National Research Institutes
・・・ Nano-physiology
IU: National Institute for Basic Biology, Okazaki National Research Institutes
・・・ Basic biology
RC: Research Center for Micro-Structure Devices (RCMSD), Nagoya Institute of Technology
・・・Nanoproperties / devices

IN: Research Institute for Electronic Science (RIES), Hokkaido University
・・・ Nanomaterials, Nanodevices
RC: Catalysis Research Center, Hokkaido University
・・・ Nanoscale catalyst
RC: Research Center for Integrated Quantum Electronics, Hokkaido University
・・・ Quantum nanostructures

RC: Research Center for Nanodevices and Systems, Hiroshima University
・・・ Ultra-nano electronic device

IN: Institute for Materials Research, Tohoku University
・・・Nanometal
IN: Institute of Multidisciplinary Research for Advanced Materials, Tohoku University
・・・ Nanohybrid materials

IA: National Institute for Materials Science (NIMS)
IA: National Institute of Advanced Industrial Science and Technology (AIST)

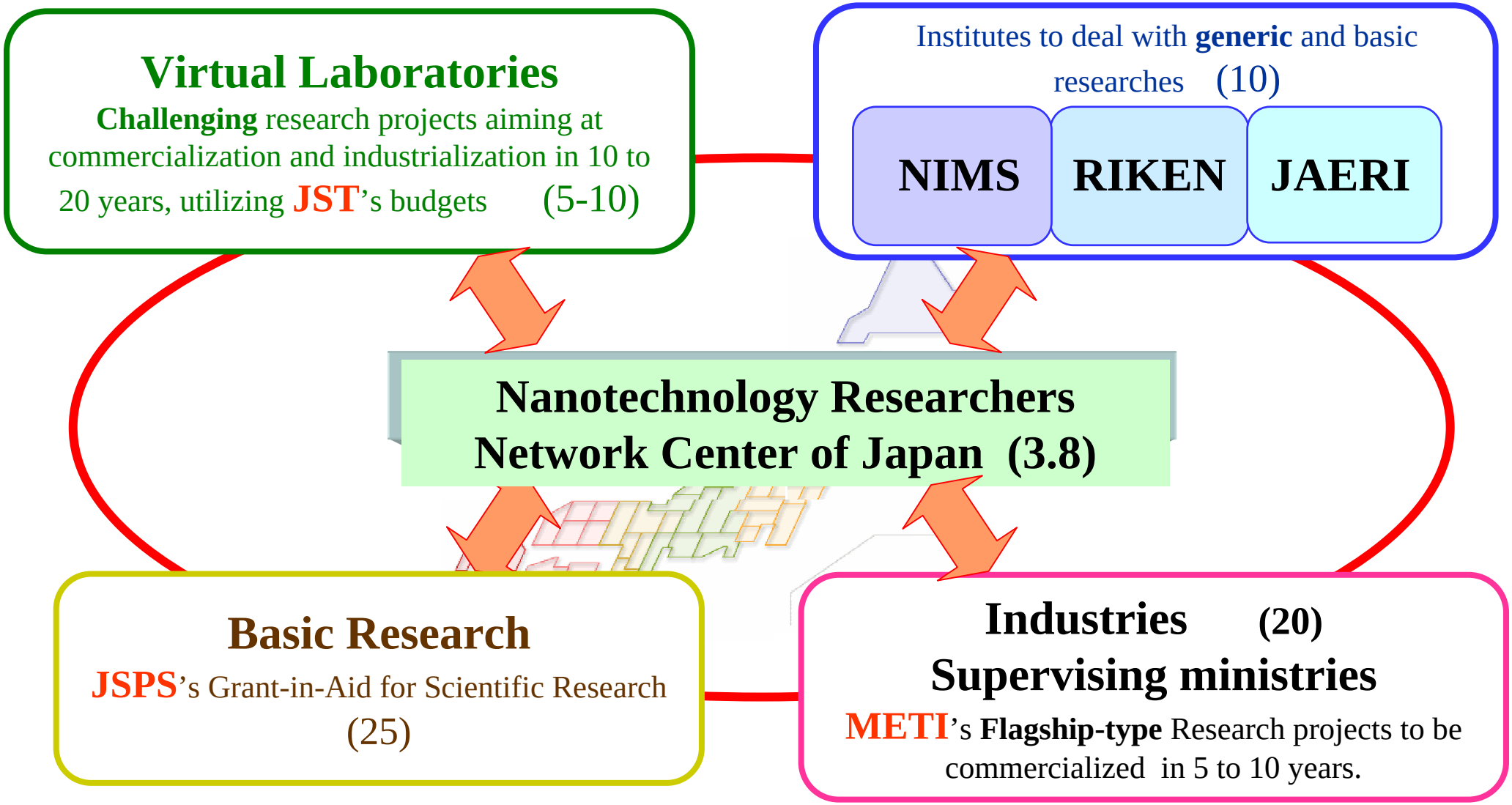


IN: Institute of Advanced Material Study, Kyushu University
・・・ Functional Nanomaterials

IU: High Energy Accelerator Research Organization (KEK)
Institute of Materials Structure Science ・・・ Nanostructure analysis
IN: Institute of Industrial Science, The University of Tokyo ・・・ Nanometal / semiconductors
IN: The Institute for Solid State Physics (ISSP), The University of Tokyo・・・ Nano properties and theory
IN: Chemical Resources Laboratory, Tokyo Institute of Technology ・・・ Formulation and application of nanomaterials
IN: Precision and Intelligence Laboratory, Tokyo Institute of Technology ・・・ Nanomachine, optical / electronic devices
IN: Materials & Structures Laboratory, Tokyo Institute of Technology・・・ Nanoceramics
RC: Research Center for Advanced Science and Technology, The University of Tokyo ・・・ Nanomaterials
RC: Research Center for Quantum Effect Electronics, Tokyo Institute of Technology ・・・ Quantum effect
IA: The Institute of Physical and Chemical Research

IN: The Institute of Scientific and Industrial Research, Osaka University
・・・ Advanced semiconductors, organic metal materials, etc.
IN: Institute for Chemical Research, Kyoto University
・・・ Nanoscale advanced inorganic materials
RC: Research Center for Ultra-Precision Science and Technology, Osaka University
・・・ Nanoprocessing, Nanofilming

Promoting Strategy of Nanotechnology by the Ministry of Education, Culture, Sports, Science & Technology(MEXT)



*Budgets in parentheses, unit: JPY1 billion

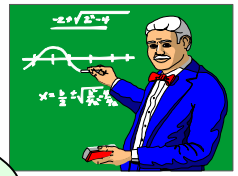
Nanotechnology Support Project(2002-2006)

User Support
for Nanotechnology
by the Common Use
of Limited and Large-scaled
Experimental Facilities

1. High-voltage Electron Microscopes
2. Nano Foundries
3. Synchrotron Radiation
4. Mol.Synthesis and Analysis

Information Networking
for Nanotechnology

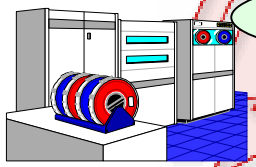
Web site



Data-base Linkage

Email Newsletter
Publication

Symposiums & Workshops



Common Use of Facilities

Education & Training Support

Nanotechnology Support Project Implementation Structure

Advisory Board
Hiroyuki Sakaki, Chairman, Professor at University of Tokyo

Window to Users / Management of the Project

Supporting and consulting the use of research facilities specialized for Nanotechnology

Supporting Groups

Ultra-HV TEM
Organizer
National Institute for Materials Science (NIMS)

Nano Foundries
Organizer
National Institute of Advanced Industrial Science and Technology (AIST)

Synchrotron Radiation
Organizer
Japan Synchrotron Radiation Research Institute

Mol. Synthesis and Analysis
Organizer
Institute for Molecular Science (IMS), Okazaki National Research Institutes

Information-Networking
Collecting and providing information
Promoting researchers' cooperation

Web page, Symposium, Workshop,
Domestic and international investigation of nanotechnology trends, and
Transferring technology

Nanotechnology Researchers Network Center of Japan

Teruo Kishi , Director General

Information-Networking

- **Circulation of up-to-date information by email newsletter, Web site and publication**
- **Investigation on present and future trends of nanotechnology**
- **Workshops & Symposiums**
  - To promote exchange of ideas among researchers
  - To enhance research collaborations in multidisciplinary fields
- **Education & Training**
  - Summer & winter schools for students and researchers
  - Training for the use of advanced facilities

Newsletter by E-mail


MEXT Nanotechnology Researchers Network Center of Japan 1/2 ページ

nanonet Ministry of Education,Culture,Sports,Science and Technology
Nanotechnology Researchers Network Center of Japan

E-mail Newsletter | Event | Nano Calendar | Nano Info | Facility Use | About Us | Link

Topics

Announcing "JAPAN NANONET BULLETIN"

The Nanotechnology Researchers Network Center of Japan will begin publication of a new e-mail newsletter called "JAPAN NANONET BULLETIN" to provide readers with the latest information on nanotechnology trends in Japan.
JAPAN NANONET BULLETIN is delivered by e-mail every other Thursday and includes interviews with leading-edge researchers as well as introductions of young researchers.
The special issue will be launched on September 4.
No charge. Subscribe now!
To subscribe, click here.

--Updated on : Aug.25, 2003--

Event Information

We added "Event" to the left menu. You can see the information and report of the symposia/workshops etc. we had and will have. Please check this new page.
-Event page

--Updated on : May.14, 2003--

Mini-Symposium on Nanomedicine and Drug Delivery

Nanotechnology researchers network center of Japan and University of Nebraska Medical Center held a mini-symposium on "Nanomedicine and Drug Delivery" at Eppley Science Hall Amphitheater, University of Nebraska Medical Center on Jan. 6, 2003. Now it is available as RealOnePlayer movies.
-Click here.

--Updated on : Jan.22, 2003--

Previous Topics

This site is optimized for Netscape Communicator/Navigator 4.06, Microsoft Internet Explorer for Windows4.01 or later version.


nanonet Ministry of Education,Culture,Sports,Science and Technology
Nanotechnology Researchers Network Center of Japan

JAPAN NANONET BULLETIN - Special Issue - September 4, 2003

ON THE OCCASION OF THE LAUNCH OF AN E-MAIL NEWSLET

Teruo KISHI, Director General
Nanotechnology Researchers Network Center of Japan, MEXT

We are pleased to announce the start of the publication of an e-mail newsletter, "JAPAN NANONET BULLETIN," on September 4. The newsletter is part of our attempt to support a wide variety of research projects, with "sharing" as its key word. We plan to disseminate the selected nanotechnology information timely and speedily in this newsletter. We believe we can play a large role in supporting researchers like you to promote your nanotechnology researches, so please pay attention to our activity.

Today, not a day passes without our hearing the word "nanotechnology." Japan is regarded as one of the leading countries in nanotechnology with high expectations from industrial and academic fields. Up until now, researchers in one field – be it physics, chemistry, biology or engineering – have tended to be working independently from other fields. However, there are no disciplinary boundaries in nanotechnology dealing with atoms and molecules. Nanotechnology works only when a wide variety of science is unified, and unifying science is essential at a time of global competition like today.

Professor Teruo KISHI
Position President, National Institute Materials Science
Professor Emeritus, The Un

JAPAN NANONET BULLETIN - 1st Issue - September 18, 2003

NANONET INTERVIEW

Hiroyuki SAKAKI, Professor
Institute of Industrial Science, The University of Tokyo

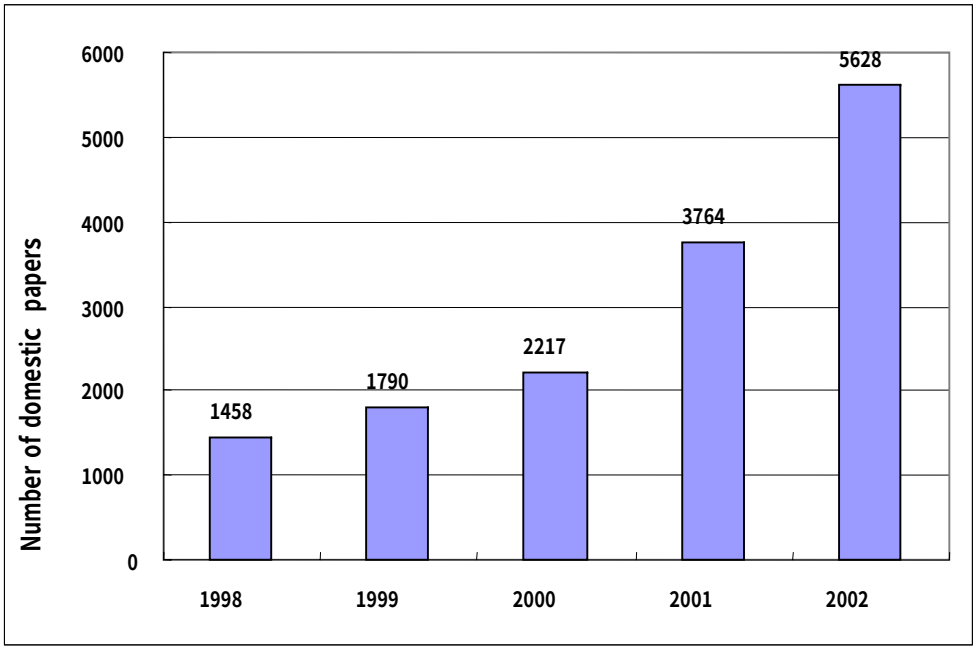
Nano-architect
--Creating a nano town in the world of electronics

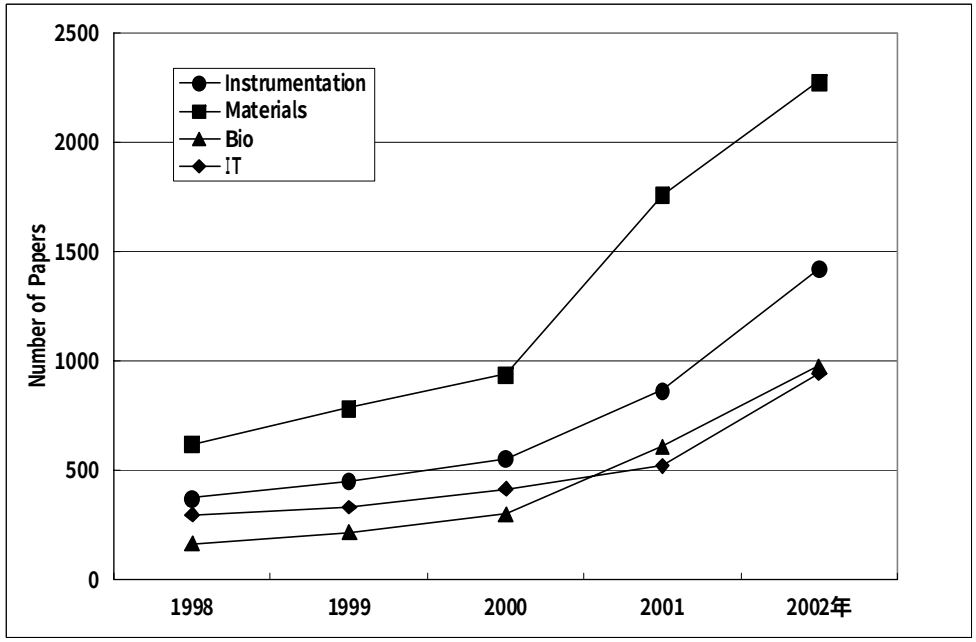
Electrons, when confined in nanostructures, follow quantum mechanics and exhibit their wave-like natures. They result in such phenomena as the tunneling effect, diffractions and interferences and enable one to speed up the transistor's response and reduce its power consumption. They also make it possible to create a set of new devices which operate on entirely different principles from those in the past. The use of quantum effects appears to be a natural outcome in electronics, where the miniaturization has been in progress. Everything started by accident, however. In 1960 the MOS transistor, the core device of today's semiconductors electronics was born. Dr. A. B. Fowler, an IBM physicist, surprised the physicists' community in 1966, when he demonstrated the quantum effect of electrons in MOS field-effect transistors (FETs) at low temperatures. In the development of MOS transistors, it was not intended to use the quantum size effect.But it happened to manifest itself, since the transistor operates on the basis of a MOS capacitor, where electrons were tightly confined in a 10nm-scale surface layer of silicon. Fowler's finding, then, led

Hiroyuki SAKAKI, Professo
Institute of Industrial Science, The U of Tokyo
1968 BS degree in electronic eng The University of Tokyo
1973 Ph.D. in electronic enginee University of Tokyo
1973 Associate Professor, Institu Industrial Science, The Uni Tokyo

- Interview of leading researchers
- Up-to-date research topics
- Other news: Regional research activities, reports on research trend, policy, patent etc.

Results of Survey on Domestic Activities on Nanotechnology Research in 2002





Number of domestic papers (Journals, proceedings etc.)

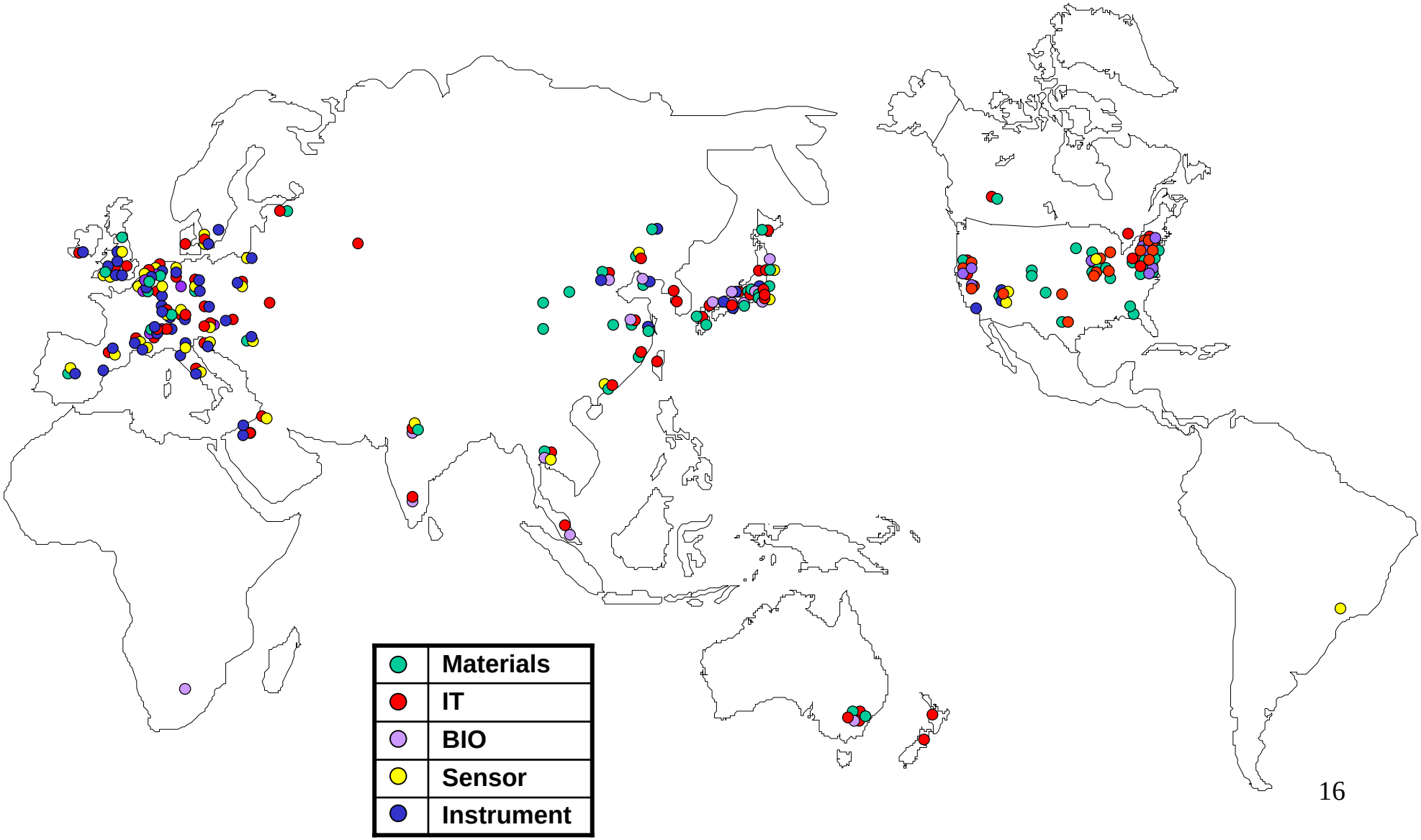
Since JJAP is not included, the real number of IT will be more than 2 times than above data.

Country specializations in nanotechnology

Country	Medical/Pharma	Materials	Chemicals	Electronics	Manufacturing
Japan	3	25	10	34	21
Korea	0	2	2	17	7
Taiwan	0	1	0	9	7
Germany	19	21	25	9	15
Switzerland	9	4	6	4	4
UK	23	15	11	6	4
Sweden	4	2	0	1	1
France	0	2	2	3	2
Spain	0	1	1	0	0
Eastern Europe	0	7	5	0	0
North America (West Cost)	28	28	19	33	26
North America (East Cost)	26	27	16	20	26
Israel	1	10	1	1	3

Questionnaire survey conducted for 100 researchers, enterprisers, inventors, venture capitalists and analysts from US, EU and Asia, 2002

Nanotechnology Map in the World



Education & Training

Interdisciplinary School

Nanobio school for students in electronics department

Training courses on facilities relating nanotechnology research for users

High voltage, high resolution TEM (October 30-31, 2003, at Osaka Univ,)

Nanofabrication

(November 10-14, 2003, at AIST)

Main workshops and symposiums organized or supported by NRNCJ

Total Number of workshops supported: 23 in 2002

- **Nov. 2002 UK-Japan Nanotech Meeting (in Tokyo)**
- **Nov. 2002 Asian NANO 2002 (in Tokyo)**
- **Jan. 2003 NSF/MEXT WS (at Cornell Univ.)**
- **Feb. 2003 JAPAN NANO 2003 (in Tokyo)**
- **Mar.2003 FRANCE / JAPAN WS (in Tokyo)**
- **Oct. 2003 NSF/MEXT WS on Nano-therapy (in Yokohama)**
- **Nov.2003 SWEDEN / JAPAN WS on Nano-Bio (in Kyoto)**
- **Feb. 2004 NSF/MEXT WS on Self-Assembly and Self-Organization (at UCSB)**
- **Mar. 2004 JAPAN NANO. 2004 (in Tokyo)**

» More to come

Nanotechnology Young Researchers Exchange Programs

■US-Japan

☐Background : Jan. 2003 Proposal for Young Researchers Exchange Program by US
April 2003 Agreement for promotion of young researchers exchange at 9th US-Japan High Level Committee on Science and Technology

☐Field : Nanoelectoronics

☐Organizers : Prof. Ushioda(Tohoku Univ.) Prof. Bose(Univ. Rohde Island)

☐Description : Exchange of young researchers between US and Japan

■UK-Japan

☐Field : Nanoelectronics, Nanometals, Nano materials science, Nanobiology, Metrology, etc

☐Organizers : Prof. Sakaki(Tokyo Univ.), Prof. Welland(Univ. Cambridge)

☐ Description : Short stay of young researchers at universities or national laboratories in UK and Japan

■Sweden-Japan

☐Field : Nanobiotechnology

☐Organizers : Prof. Aizawa(TiTech)

☐ Description : Short stay of young researchers at universities or national laboratories in Sweden and Japan

US – JAPAN YOUNG SCIENTIST EXCHANGE PROGRAM IN NANOSCIENCE AND NANOTECHNOLOGY

• Encourage and promote interactions and collaborations between Japanese and US young scientists working in nanoscience and nanotechnology

•Both US and Japanese teams have workshops and visit laboratories to learn from cutting edge research at these institutions

Workshop at MIT on September 25, 2003

1st US/Japan young scientists exchange program
September 25 – October 3, 2003 in US,
November 4 – 13, 2004 in Japan

US team: Prof. Bose and 12 young scientists

Japanese team: Prof. Ushioda, Prof. Komiyama and 12 young scientists

Lab Tours

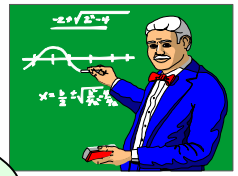
Nanotechnology Support Project(2002-2006)

User Support
for Nanotechnology
by the Common Use
of Limited and Large-scaled
Experimental Facilities

1. High-voltage Electron Microscopes
2. Nano Foundries
3. Synchrotron Radiation
4. Mol.Synthesis and Analysis

Information Networking
for Nanotechnology

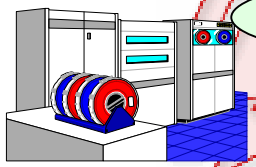
Web site



Email Newsletter
Publication

Data-base Linkage

Symposiums & Workshops



Common Use of Facilities

Education & Training Support

User Facilities of the Nanotechnology Support Project

Ultra-HV TEM

- Institute for Materials Research (IMR), Tohoku University.
- National Institute for Materials Science (NIMS)
- Research Center for Ultra-High Voltage Electron Microscopy, Osaka University
- Research Laboratory for High Voltage Electron Microscopy, Kyushu University

No. of use: 131

Nano Foundries

- National Institute of Advanced Industrial Science and Technology (AIST)
- Nanotechnology Research Laboratory (NRL), Waseda University
- Research Center for Quantum Effect Electronics, Tokyo Institute of Technology (TITEC)
- Nanoscience and Nanotechnology Center, Osaka University
- Research Center for Nanodevices and Systems, Hiroshima University

No. of use: 116

Observing Nano

Nanotechnology Researchers

Fabricating Nano

Synchrotron Radiation

- SPring-8
- Synchrotron Radiation Center (SR Center), Research Organization of Science and Engineering, Ritsumeikan University

No. of use: 115

Mol. Synthesis and Analysis

- Institute for Molecular Science (IMS), Okazaki National Research Institutes
- Institute for Chemical Research, Venture Business Laboratory, and Advanced Research Institute of Nanoscale Science and Engineering, Kyoto University
- Graduate School of Engineering, Kyushu University

No. of use: 143

Univ.: Company: Public Institute = 7 : 2 : 1 , in 2002

Facilities for Researchers

Technical Consultation

Researchers in each facility consult on technical issues.

Measurements/Sample Preparations on Request

Simple measurements and preparation of samples will be undertaken by the collaborating facility.

Instrument Utilization

Applicants who prepare their own samples will be able to make measurements by using the facilities available if sufficiently proficient in the use of the instrument.

Collaboration Research

Applicants and researchers in the facilities will conduct the research in collaboration.

Goal of Nano-Networking

1. **Enhancing the infrastructure in nanotechnology research**
2. **Interdisciplinary fusion among researchers in various research fields**
3. **Constructing the base of the domestic and international networks**