

# AIST International Symposium on Nanotechnology

November 13-14, 2001

Tokyo International Exchange Center in Tokyo Academic Park

It was intended to target the industrial application of nanotechnology as well as basic and pioneering R & D. This symposium was composed of three sessions; the opening session, plenary session, and theme session.

## Opening Session

Japan's Science and Technology Basic Plan  
and AIST's Research and Development Strategy



Hiroyuki Yoshikawa (AIST)

In the opening session, Dr. Hiroyuki Yoshikawa, President of AIST, presented "Japan's Science and Technology Basic Plan and AIST's Research and Development Strategy," where nanotechnology, one of four national prioritizations of Science & Technology, was mentioned as follows:

"AIST is one of the most experienced institutes for R & D on nanotechnology in Japan. AIST, in cooperation with Angstrom Technology Partnership, has been conducting a ten-year project called 'Atom Technology Project' since 1992, when it was Agency of Industrial Science and Technology (former AIST).

Our priorities are to make nano-science as a new academic discipline and proceed using the best approach of each specialist in various research areas in AIST. With the collaboration of academia, private sector and government, we expect to be contributable for maximum results to establish nano-industry."

## Plenary Session

Five researchers leading nanotechnology gave presentations. In this session, Dr. Kazunobu Tanaka, one of AIST trustees and the project leader of "Atom technology project," introduced the fruitage of the project.

Atom technology project is pioneering research for nanotechnology in the world, and carried out by "Joint Research Center for Atom Technology (JRCAT)", unique concentrated joint research system, comprising industrial, governmental and academic sectors. In this presentation, two topics, "silicon nanotechnology" and "spin electronics", were picked up as recent R & D activities.

Atom technology project will terminate in March 2002. Some plantlets of human resources and research outputs developed in JRCAT have been transferred to AIST and will grow up to forest of new science and technology.

### Program

Carbon Nanotubes, Bismuth Nanowires, and Low-Dimensional Thermoelectric Materials

Mildred S. Dresselhaus ; Massachusetts Institute of Technology

Industrial Polymer Research ; What Role could Nanotechnology Play?

Joseph Put ; DSM Research

Atom Technology Project

Kazunobu Tanaka ; AIST

R&D on Nanomaterial in National Institute for Materials Science

Kazuhiro Yoshihara ; National Institute for Materials Science

Application of Nanotechnology to Electronics

Junichi Sone ; NEC, Fundamental Research Laboratory



Dr. M.S. Dresselhaus



Dr. J. Put



Dr. K. Tanaka



Dr. K. Yoshihara



Dr. J. Sone



## Theme Session

Nanotechnology is integrated and comprehensive technological area, covering a wide range of fields such as information technology, machine, life science and materials.

In this session, we focused on four themes corresponding to sequential stages of nanotechnology ( to produce , to observe, to functionalize, and to utilize nanostructure) to have more intensive discussions regardless of one's research field. Fourteen researchers at home and abroad participated in the sessions as lecturers, including the AIST researchers who presented his achievement in the four themes.

Besides these, we have more research works on nanotechnology, which are introduced briefly in AIST homepage ([http://www.aist.go.jp/index\\_en.html](http://www.aist.go.jp/index_en.html)).



### Program

#### Advanced Laser Microfabrication and its Applications

Peter R. Herman ; [University of Toronto](#)

#### Nano-Manufacturing in Storage Industries

Kenjiro Watanabe ; [SONY, Core Technology & Network Company](#)

#### Nano-Manufacturing : Its Role and Importance

Akira Yabe ; [AIST](#)

### Program

#### Imaging of Liquid Structures at the Nanometer Scale : Wetting and Capillarity

Miquel Salmeron ; [Lawrence Berkeley National Laboratory](#)

#### Direct Measurement of Electrical Conductivity of Nanoscale Films and Wires Using Multiple-Probe STMs

Masakazu Aono ; [Osaka University](#)

#### Use of Scanned Probes for Fabricating Nanostructured Materials and Devices

Hiroshi Yokoyama ; [AIST](#)

#### Computational Science for Nanotechnology

Takahisa Ohno ; [National Institute for Materials Science](#)

#### SPM Observation of Organic Materials

Hans Joachim Güntherodt ; [University of Basel](#)

### Program

#### Switchable Hyper Helical Polymers toward Molecular Processors

Michiya Fujiki ; [NTT Basic Research Laboratories](#)

#### Micro- and Nanofabricated Chip Technology for Genomic Proteomic Analysis and a Single DNA Molecule Manipulation

Yoshinobu Baba ; [University of Tokushima](#)

#### Ultra-High Density Molecular Memory and Molecular Computer

Kazumi Matsushige ; [Kyoto University](#)

#### Molecule-up Approach for Versatile Nanotube Technology

Toshimi Shimizu ; [AIST](#)

### Program

#### Flat Panel Display using Carbon Nanotubes

Jong Min Kim ; [Samsung AIT/Samsung SDI](#)

#### Fabrication and Device Application of Silicon Nanostructures

Shunri Oda ; [Tokyo Institute of Technology](#)

#### Resonant Tunneling Magneto-Resistance Devices and Its Development into Nano-Spinelectronics

Yoshishige Suzuki ; [AIST](#)

We will hold an international symposium annually, focusing on hot topics of scientific and technological progress.

# Be a "good trouper" to society

Masayuki Kamimoto  
Deputy Director of Planning Headquarters



Upon launching the AIST, one of the major emphasis was placed on "the tie with society". As the new year starts, I would like to look back on the 9 month course of our activities focusing on several key topics: International co-operation, Industry-academia-government collaboration, Technological information, Dissemination of research achievement, and Public relations.

## **AIST** **1** Common goal: Contribution to society's sustainable development

The first and foremost goal of AIST is the contribution to society's sustainable development by means of research and development activities in the field of industrial technology. R&D of earth-friendly industrial technologies is vital to restoration of the green planet, which has been long neglected since the era of the Industrial Revolution.

## **AIST** **2** Hosting International Symposiums

The International Affairs Department is in charge of international co-operative activities. In 2001, several international symposiums were held including "AIST Waterfront Symposium" commemorating the opening of AIST Tokyo Waterfront and "AIST International Symposium on Nanotechnology -Potential Industrial Technology in 21 Century-". In addition to the AIST symposiums, a number of researchers of AIST attended various bilateral international meetings such as the 3<sup>rd</sup> Japan-Korea Science and Technology Forum, Workshop on Italy-Japan Interdisciplinary Materials Science and Technology, Japan-Australia joint Symposium on Nanotechnology.

## **AIST** **3** Conclusion of the co-operation agreements with NIST, CNRS and other research institutes

Following the conclusion of the co-operation agreement with NIST (US National Institute of Standard and Technology) upon certification issue of a product's compliance with standards, we effected General Agreement on Comprehensive Research Co-operation with CNRS (Centre National de la Recherche



Scientifique). We are aiming at establishing a close partnership with major research institutes of different countries.

## **AIST** **4** Mr. Sakuraba, Senior Researcher, appointed as an Antarctic wintering team member

Many AIST researchers went abroad to attend various international meetings in 2001 although the number shrank slightly since the September 2001 terrorist attacks in the USA. Eighteen researchers were sent to various international organizations including UNIDO (United Nations Industrial Development Organization) and International Bureau of Weights and Measures. Toshiaki Sakuraba, senior researcher set off to the South Pole as a member of the 43<sup>rd</sup> Antarctic Wintering Team on the November 28.



## **AIST** **5** Entrepreneurial Boom

Seven venture businesses have been set up based on the research results at AIST. We encourage the new businesses in terms of technology transfer, patent acquisition to break new ground for the researchers who have an interest in creating new business fields. The department of industry-academia-government collaboration is assigned to the supporting activities in this area.

Firstly, TLO, "AIST Innovations" was established to facilitate technology transfer. This is the first authorized organizations under the Technology Licensing Organization Law. The mission of AIST Innovations is to transfer the technologies based on the AIST's intellectual properties. Coordinators of Collaboration Department and Collaboration Centers are providing assistance to the technical guidance, co-operative researches and so on together with Manufacturing Technical Support Office established at each Collaboration Center.

The 3rd Japan-Korea joint Forum on Science and Technology



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### More Funded Research Projects and Increase in Number of visiting professors of Affiliated Postgraduate Institutes

The number of research projects funded by the organizations outside AIST has increased from 5 in 2000 to 41 at the point of September 2001. As for partnerships with academia, the number of the visiting professors at the related postgraduate schools are 198 (as of September 2001), a significant increase compared to that in 2000.

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### Expansions of research exchanges in Tsukuba city

The research institutes affiliated to the former Agency of Industrial Science and Technology had kept various research partnerships with research organizations which are in a close tie with them, including Central Research Institute of Electric Power Industry, Communications Research Laboratory and so on. The AIST initiated a new research workshop together with National Institute for Materials Science which was also re-established as one of the independent administrative institutions in April 2001. In August, the AIST co-hosted a seminar on industrial development with Tsukuba city, entitled "Local Industry in Tsukuba city and Partnership with the AIST" .

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### AIST• Technology Information Seminar

It is essential to set a course to realize the industrial technology which contributes to our society's sustainable development. AIST set up the Technology Information Department and Planning Headquarters to enforce the strategic planning of the organization. Technology Information Department is in charge of organizing "AIST Technology Information Seminar" which is intended to offer latest information of R&D projects, systems etc. of national institutes which may be useful in promotion of R&D activities.

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### Geological Museum Opens on Holidays

The AIST research centres throughout Japan were opened to public for the first time since the AIST was established. As the open house day in Tsukuba coincided with a public holiday, over 3000 people visited the institute to see the achievements of the research activities. In addition, Information Technology Research Institute and Intelligent System Institute had a separate open house respectively. Geological Museum which boasts a large collection of valuable specimens has been open on holidays since June. High school students from Miyake Island were invited to a lecture upon volcanoes by a researcher who specializes in the research of volcanoes on the island.

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### AIST Series to be published in March 2002

The AIST series of educational books upon industrial technology are to be published by Maruzen Co., Ltd. from March 2002. Information & Publication Division takes charge of public relations / publication including AIST hosting lectures, press conferences and so on.

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As AIST is a consolidated organization of 15 research institutes, the general understanding of our activities is not necessarily sufficient. Now we have set up a new research organization. We aim at introducing a number of influential research achievements which may have an impact in the field of industrial technology based on our elaborated strategy. It is a first step forward for us to become a solid support for society.